User Manual

PCM-9588

Intel® Celeron® M EBX SBC with DVI/ TTL/ VGA/ LVDS/ LAN/ 6 COM/ 2 SATA / 6 USB2.0/ 16bit GPIO

Trusted ePlatform Services

ADVANTECH

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- Warranty has been voided by removal or alternation of product or part identification labels.
- The product has been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable physical or operating environment; improperly maintained by the customer; or failure caused which ADVANTECH is not responsible whether by accident or other cause. Such conditions will be determined by ADVANTECH at its sole unfettered discretion.
- The product is damaged beyond repair due to a natural disaster such as a lighting strike, flood, earthquake, etc.
- Product updates/upgrades and tests upon the request of customers who are without warranty.

Phoenix Operation User Notes

Issue date: OCT 2008

Terms & Conditions

TERMS (Lifetime Factors)

Advantech's Phoenix Operation is a screening service to test a system's ability to operate under a wide range of temperatures.

Naming rules for Advantech's Phoenix Operation:

1. Z (Advantech Phoenix Gold): A product bearing this indicator (Z) has already passed Advantech's -20 ~ 80°C high/low temperature and burn-in test, based on Advantech's internal screening process.

2. Z2 (Advantech Phoenix Platinum): A product bearing this indicator (Z2) has already passed Advantech's -40 ~ 85°C high/low temperature and burn-in test, based on Advantech's internal screening process.

During the burn-in process the test target must operate seamlessly with the test software.

Listed below are precautions to be aware of before beginning to use the product:

Higher temperatures accelerate chemical and physical reactions at approximately a factor of two for every ten degrees centigrade. These faster reactions can quickly reduce a module's operating lifetime. Wide temperature fluctuations also cause mechanical fatigue.

CONDITIONS (Warranty Policy)

1. All boards are screened and operable during the screening process.
2. Advantech warrants the functionality of the board to operate within the appropriate temperature range (Z: two years; Z2: one year).
3. High operating temperature will significantly shorten the MTBF (mean time between failures).
4. In extremely high or low temperatures certain components might exceed the maker's temperature specifications. Advantech is not responsible for individual parts operating at temperatures outside their specifications.

Declaration of Conformity

FCC Class A

This device complies with the requirements in part 15 of the FCC rules: Operation is subject to the following two conditions:

1.This device may not cause harmful interference, and

2. This device must accept any interference received, including interference that may cause undesired operation

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own

expense. The user is advised that any equipment changes or modifications not expressly approved by the party responsible for compliance would void the compliance to FCC regulations and therefore, the user's authority to operate the

equipment.

> **Caution!** *There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.*

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
    – Product name and serial number
    – Description of your peripheral attachments
    – Description of your software (operating system, version, application software, etc.)
    – A complete description of the problem
    – The exact wording of any error messages

Packing List

Before installation, please ensure the following items have been shipped:

- 1 PCM-9588 SBC
- 1 Startup manual
- 1 Utility CD
- 1 mini jumper pack   9689000002

Ordering information

Model Number Description

PCM-9588T-M0A1E	Intel C-M 600M w/TTL/CRT/6 COM/Audio/2SATA/16 GPIO
PCM-9588F-S0A1E	Intel C-M 1.0G w/LVDS/DVI/CRT/6 COM/Audio/2SATA/16 GPIO

Part No.	CPU	L2 Cache	Chipset	LVDS	TTL	CRT	DVI	10/100 LAN	Audio	USB 2.0	SATA	RS-232	RS/232/ 422/485	GPIO	LPT	CF	PC/104+	ATX Power	AT Power	Thermal Solution	Operation Temp.
PCM-9588T-M0A1E	C-M 600 MHz	512K L2	910GMLE	X	V	V	X	1	V	6	2	4	2	16	1	1	1	V	V	Passive	0 ~ 60° C
PCM-9588F-S0A1E	C-M 1.0 GHz	0 L2	910GMLE	48bit	Optional	V	V	1	V	6	2	4	2	16	1	1	1	V	V	Passive	0 ~ 60° C

Optional accessories

Model Number Description

PCM-10586-9588E	Wiring kit for PCM-9588 Series
1703100260	USB cable
PCM-110-00A3E	1-slot PCI riser card for 5.25" biscuits
PCM-120-00A3E	2-slot PCI riser card for 5.25" biscuits
PCM-200-00A2E	PC/104-Plus to PCI bus module
9681000041	24 bit LCD cable adaptor (for 5 V LCD panel)
9681000040	24 bit LCD cable adaptor (for 3.3V LCD panel)
CF-HDD-ADP	CompactFlash 50-pin to IDE 44-pin adapter

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Chapter 1

General Introduction

This chapter gives background information on PCM-9588.

Sections include:

■ Introduction

■ Specifications

1.1 Introduction

- Fanless design, Intel® Celeron® M Processor on board type
- EBX form factor standard, supports PC/104-Plus
- One SODIMM up to 2GB DDR2 400 MHz (910GMLE)
- Display Combination: CRT+ LVDS / DVI+ LVDS/ DVI+ CRT/ CRT+ TTL/ DVI+TTL
- 10/100 Mbps Ethernet support UL60601 Design, GIGA LAN optional
- Supports Wake-on-LAN, Wake-on-Modem
- Supports LCD backlight turn-off function
- Supports ATX/ AT power modes
- AC97 Audio on board
- 6 COM (Supports Auto flow control), 2 SATA, 6 USB 2.0, 16-bit GPIO

1.2 Product Specifications

General

- **CPU:** Intel® Celeron® M 600M/1.0G Processor on board
- **L2 Cache:** Celeron® M 600M 512K L2/ Celeron® M 1.0G 0 L2
- **System Chipset:** Intel 910GMLE + ICH6M
- **BIOS:** Award 4Mb LPC BIOS
- **System Memory:** One SODIMM up to 2GB DDR2 400 MHz
- **Power Management:** APM1.2, ACPI support
- **Watchdog Timer:** 255-level interval timer, setup by software, Super I/O integrated, SMSC Controller
- **Expansion Interface:** Supports PC-104 Plus
- **Battery:** Lithium 3 V / 196 mAH

Note! *For Electrical Specification information, please refer to Appendix D.*

1.3 Chipset

1.3.1 Functional Spec.

1.3.1.1 Processor

Processor	■ Intel Celeron M processor 600MHz (512K L2) / 1.0GHz(0L2) ■ CPU Process: 90nm. ■ 400 MHz FSB Support

1.3.1.2 Chipset (910GMLE)

North Bridge	
Controller Hub	Intel® 910GMLE chipset
FSB	400MHz for 910GMLE

Display	VGA port 18/36-bit TTL DVI (36 bit) LVDS (48 bit)
Features	Intel GMA 900,(166 MHz/160 MHz @1.05v) 2D Display core frequency support from 133 MHz & 190/200 MHz @ Vcc = 1.05 / 1.5 V depending on Host/Memory configuration 3D Render core frequency support from 133 MHz & 160/166 MHz @ Vcc = 1.05 / 1.5 V depending on Host/Memory configuration Two SDVO ports multiplexed with PCI Express graphic interface Dual Channel LVDS interface support 36 bits CRT monitor resolutions supported: Supports up to QXGA(2048x1536) LVDS panel resolution supported: Supports up to SXGA (1400x1050) Dual independent display options with digital display

VGA	Analog CRT DAC interface support Supports max DAC frequency up to 400 MHz 24-bit RAMDAC support DDC2B compliant Digital/Analog Converter for CRT: QXGA (2048x1536)
DVI	able to drive a DFP display at a pixel rate of up to 165MHz supporting UXGA (1600x1200) resolution displays. Digital Visual Interface (DVI) Transmitter up to 165M pixels/second supports from CH7307
LVDS	LVDS: Up to SXGA (1400x1050) --- 910GMLE Integrated dual channel LVDS interface supported on Display Pipe B only Supports 25 to 112 MHz single/dual channel LVDS interface: Single channel LVDS interface support: 1 x 18 bpp Dual channels LVDS interface support: 2 x 18 bpp Maximum Wide panel size supported up to WUXGA Ambient Light Sense support for automatic backlight brightness adjustments Intel Display Power Savings Technology 2.0 support Supports Single pipe simultaneous display with the CRT DAC and the LVDS ports under the following conditions: Timings must match for both display Panel Fitting. Panning, and Center mode supported Spatial Dithering support to emulate up to 16 million colors for 18bpp TFT panels. Spread spectrum clocking (SSC) supported Supports down and center SSC via an SSC clock from an external SSC clock chip. Supports down spread of - 2.5% or center spread of ± -1.25% in reference 30-50 kHz modulation rate SSC must be disabled for LVDS port and CRT DAC single pipe simultaneous display mode. Panel Power Sequencing support Power down state can be either zero volt or high impedance Integrated PWM interface for LCD Backlight Inverter Control
TTL	Supports up to 1600x1200x32 bpp at 60 Hz 18,36-bit, TTL signal supports via NS_DS90C3202
Internal Graphics Features	Intel GMA 900, 910GMLE: 2D Display core frequency support from 133 MHz & 190/200 MHz @ Vcc = 1.05 / 1.5 V depending on Host/Memory configuration 3D Render core frequency support from 133 MHz & 160/166 MHz @ Vcc = 1.05 / 1.5 V depending on Host/Memory configuration

1.3.1.3 Chipset (ICH6M)

I/O:

LPT	1
RS-232	4
RS-232/422/485	2 (Default RS-422/485, RS-232 by optional request)
K/B	1
Mouse	1
USB	6 x USB2.0
Audio	AC97, Line-in, Line-out, Mic-in, speaker out (R/L)
GPIO	16-bit general purpose input/output
IRDA	115 kbps (optional by request) shared from COM2

South Bridge	
Controller Hub	Intel ICH6M
PCI Compliant	Supports 33MHz PCI 2.2 specification Supports for 64-bit addressing on PCI using DAC protocol

PCI Bus	■ PCI masters
	      PCI to ISA bridge (ITE8888G)
	      10/100 LAN(RTL8100CL-LF)

Other Feature	■ 6 USB 2.0 ports, 480MB/s
	■ 2 Serial ATA(150MB/s)
	■ Power Management
	■ FWH interface to Flash BIOS
	■ 6 COM ports, 4 x RS-232; 2 x RS-232/422/485 Signal (Support Auto flow control).
	   COM1, 2, 3, 4: RS-232
	   COM5, 6: RS-422/485 (Default RS-422/485, RS-232 by optional request)

1.3.1.4 Other (chipset)

LAN	
Chipset	LAN 1: Realtek RTL8100CL-LF for 10/100 Giga LAN(RTL8110SCL-LF) optional (preserve circuit) Preserve UL60601 design only on LAN1
IEEE Compliant	Fully compliant with IEEE 802.3, IEEE 802.3u and IEEE 802.3ab
LAN LED	LED1: Off for 10M LAN, Green or 100M LAN
	LED2: On for Link, flash for active,
Disable LAN through BIOS	Yes
Wake on LAN	Yes (S1 only)
Boot from LAN	Yes (S5 only)
LED connector	pin header - with TX/RX LED signal
Audio	
Chipset	AC97 Audio
Codec	ALC203
Rear panel output	Line-In, Line-out, Mic-In
Amplifier	Yes. (2.2W)
Hardware Monitor	
Chipset	LPC I/O for onboard alarm

	SMSC3106
Fan	Programmable automatic fan monitor based on temperature. System FAN Power Connector x 1 It should be added near by the CPU socket Connector type: 2.0mm Wafer box 3x1 Default is +12V Fan Pin1: GND Pin2: +12V Pin3: Fan speed signal input
Temperature	monitors system/CPU temperature and voltage status
Voltage	2.5V,Vcore, 12V, 5V, 3.3V,
Super I/O	
Chipset	SMSC3106
Fan speed monitor	N/A
Temperature	Yes

1.3.2 Mechanical Specifications

1.3.2.1 Dimensions (mm)
203mm (L) x 146mm (W) (8" x 5.75")

1.3.2.2 Height on Top (mm)
15.4 mm (PCI slot)

1.3.2.3 Height on Bottom (mm)
8.5 mm (CF socket)

1.3.2.4 Heatsink Dimensions (mm)
50 x 50 x 10 mm (Heatsink)

1.3.2.5 Weight (g) with Cooler
480 g

1.3.3 Electrical Specifications

1.3.3.1 Power supply Voltage

Power Type	AT/ATX
Power Supply Voltage	ATX: 5 VSTB, +5 V ±5%, +12 V ±5%, external 12 V optional for LCD Inverter, PCI & PCI-104 Plus
	AT: 5 V only to boot up, external 12 V optional for LCD Inverter, PCI & PCI-104 Plus
Power Management	APM, ACPI
Battery	Lithium 3 V/196 mAH

1.3.3.2 Power supply Current

PCM-9588 AT Power Consumption

Test Condition:

OS - WindowsXP SP2

Add-in Card - None

CF Card - Transcent 1G

MiniPCI Card - None

HDD - 160GB SATA *1

BIOS - 9588x049

KeyBoard/Mouse - USB or PS/2 Interface

Display - CRT

CPU type	Status	+V3.3	+V5SB	+V5	+V12	+V3.3	+V5SB	+V5	+V12	+V3.3	+V5SB	+V5	+V12
		DDRII 512MB/533MHz				DDRII 1GB/533MHz				DDRII 2GB/667MHz			
Intel Celeron M 600MHz	DOS Idle	N/A	N/A	2.5A	0.02A	N/A	N/A	2.88A	0.03A	N/A	N/A	2.55A	0.01A
	S3	N/A	N/A	1.78A	0.01A	N/A	N/A	1.84A	0.01A	N/A	N/A	1.86A	0.03A
	Win Idle	N/A	N/A	2.79A	0.01A	N/A	N/A	2.99A	0.02A	N/A	N/A	2.9A	0.03A
	Win HCT11.2	N/A	N/A	3.28A	0.02A	N/A	N/A	3.56A	0.02A	N/A	N/A	3.21A	0.02A

CPU type	Status	+V3.3	+V5SB	+V5	+V12	+V3.3	+V5SB	+V5	+V12	+V3.3	+V5SB	+V5	+V12
		DDRII 512MB/533MHz				DDRII 1GB/533MHz				DDRII 2GB/667MHz			
Intel Celeron M 1 GHz	DOS Idle	N/A	N/A	3.05A	0.01A	N/A	N/A	3.49A	0.01A	N/A	N/A	3.14A	0.01A
	S3	N/A	N/A	2.26A	0.01A	N/A	N/A	2.33A	0.01A	N/A	N/A	2.28A	0.02A
	Win Idle	N/A	N/A	3.43A	0.01A	N/A	N/A	3.58A	0.01A	N/A	N/A	3.62A	0.01A
	Win HCT11.2	N/A	N/A	4.01A	0.01A	N/A	N/A	4.25A	0.01A	N/A	N/A	4.15A	0.01A

PCM-9588 ATX Power Consumption

Test Condition:

OS - WindowsXP SP2

Add-in Card - None

CF Card - Transcent 1G

MiniPCI Card - None

HDD - 160GB SATA *1

BIOS - 9588x049

KeyBoard/Mouse - USB or PS/2 Interface

Display - CRT

CPU type	Status	+V3.3	+V5SB	+V5	+V12	+V3.3	+V5SB	+V5	+V12	+V3.3	+V5SB	+V5	+V12
		DDRII 512MB/533MHz				DDRII 1GB/533MHz				DDRII 2GB/667MHz			
Intel Celeron M 600MHz	DOS Idle	N/A	N/A	2.04A	0.02A	N/A	N/A	2.52A	0.02A	N/A	N/A	2.5A	0.01A
	S3	N/A	N/A	1.76A	0.02A	N/A	N/A	1.77A	0.01A	N/A	N/A	1.89A	0.02A
	Win Idle	N/A	N/A	2.42A	0.02A	N/A	N/A	2.45A	0.01A	N/A	N/A	2.52A	0.02A
	Win HCT11.2	N/A	N/A	3.23A	0.02A	N/A	N/A	3.48A	0.02A	N/A	N/A	3.4A	0.01A

CPU type	Status	+V3.3	+V5SB	+V5	+V12	+V3.3	+V5SB	+V5	+V12	+V3.3	+V5SB	+V5	+V12
		DDRII 512MB/533MHz				DDRII 1GB/533MHz				DDRII 2GB/667MHz			
Intel Celeron M 1 GHz	DOS Idle	N/A	N/A	3.05A	0.01A	N/A	N/A	3.49A	0.01A	N/A	N/A	3.14A	0.01A
	S3	N/A	N/A	2.26A	0.01A	N/A	N/A	2.33A	0.01A	N/A	N/A	2.28A	0.02A
	Win Idle	N/A	N/A	3.43A	0.01A	N/A	N/A	3.58A	0.01A	N/A	N/A	3.62A	0.01A
	Win HCT11.2	N/A	N/A	4.01A	0.01A	N/A	N/A	4.25A	0.01A	N/A	N/A	4.15A	0.01A

1.3.3.3 **RTC Battery**
Typical Voltage: 3.0V
Normal discharge capacity: 196mAh

1.3.4 Environment Specifications

1.3.4.1 **Operating temperature**
0 ~ 60° C (32 ~ 140° F)

1.3.4.2 **Operating Humidity**
0% ~ 90% Relative Humidity, non-condensing

1.3.4.3 **Storage temperature**
Standard products (0 ~ 60° C)
Storage temperature: -20 ~ 70° C

1.3.4.4 **Storage relative Humidity**
Standard products (0 ~ 60° C)
Relative humidity: 95% @ 60° C

Phoenix products (-20 ~ 80° C)
Relative humidity: 95% @ 60° C

Platinum Phoenix products (-40 ~ 85° C)
Relative humidity: 95% @ 60° C

Chapter 2

H/W Installation

This chapter explains the setup procedures of the PCM-9588 hardware, including instructions on setting jumpers and connecting peripherals, switches, indicators and mechanical drawings.

2.1 Jumpers

2.1.1 Jumper list

JP1   VIO Select for PCI and ISA Slot
JP4   CMOS Clear
JP6   RS422/RS485 Select for COM5 and COM6
JP8   LCD Panel Power Select
JP9   Backlight Control Select

2.1.2 Jumper Settings:

Table 2.1: JP1: VIO Select for PCI and ISA slot	
Part Number	1653003100
Footprint	PH_3x1V_2.54mm
Description	PIN HEADER 3*1P 180D(M) 2.54mm DIP WO/Pb
Setting	**Function**
(1-2)	+V5
(2-3)	+V3.3

Table 2.2: JP4: CMOS Clear	
Part Number	1653003101
Footprint	JH3X1V-2M
Description	PIN HEADER 3*1P 180D(M) 2.0mm DIP SQUARE W/O Pb
Setting	**Function**
(1-2)	Normal
(2-3)	Clear

Table 2.3: JP6: RS422 / RS485 Select for COM5 and COM6	
Part Number	1653004201
Footprint	JH4X2V-2M
Description	PIN HEADER 4*2P 180D(M) 2.0mm DIP WO/Pb
Setting	**Function**
(1-2)	COM5= RS485
(3-4)	COM5= RS422
(5-6)	COM6= RS485
(7-8)	COM6= RS422

Table 2.4: JP8: LCD Panel Power Select

Part Number	1653003101
Footprint	JH3X1V-2M
Description	PIN HEADER 3*1P 180D(M) 2.0mm DIP SQUARE W/O Pb
Setting	**Function**
(1-2)	+V5
(2-3)	+V3.3

Table 2.5: JP9: Backlight control select

Part Number	1653003101
Footprint	JH3X1V-2M
Description	PIN HEADER 3*1P 180D(M) 2.0mm DIP SQUARE W/O Pb
Setting	**Function**
(1-2)	PWM Control
(2-3)	Voltage Control

2.1.3 Jumper description

Cards can be configured by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To close a jumper, you connect the pins with the clip. To open a jumper, you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2, or 2 and 3.
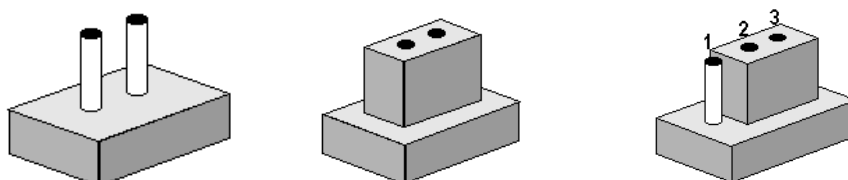
The jumper settings are schematically depicted in this manual as follows.

A pair of needle-nose pliers may be helpful when working with jumpers. If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

Warning! *To avoid damaging the computer, always turn off the power supply before setting jumpers. And when clearing CMOS, set the jumper back to 3.0 V Battery On, before turning on the power supply.*

2.2 Connectors

2.2.1 Connector list

Table 2.6: Connector List	
CN2	Audio CD-In Connector
CN4	Audio Connector
CN5	Power connector
CN6	Inverter connector
CN8	VGA connector
CN9	LVDS connector
CN10	TTL connector (High Bits)
CN11	TTL connector (Low Bits)
CN12	Lan connector
CN13	HDD LED and POWER LED connector
CN15	LPT / FDD connector
CN16	IDE connector
CN17	PC-104/+ connector
CN19	COM1~4 connector
CN20	USB1/2 connector
CN22	Reset Bottom connector
CN23	Power Bottom connector
CN24	SIR connector
CN25	PS2 Keyboard/Mouse connector
CN26	CF TYPEII connector
CN27	-V5 and -V12 connector
CN28	USB3/4 connector
CN29	DDR2 SODIMM Socket
CN30	DVI Connector
CN31	SATA 1 Connector
CN32	SATA 2 Connector
CN33	Battery Connector
CN34	LAN LED Connector
CN36	GPIO1 Connector
CN37	GPIO2 Connector
CN38	USB5/6 connector
CN41	COM5/6/422/485 connector

2.2.2 Connector Settings

2.2.2.1 Audio CD-In Connector (CN2)

CD In cable used to send audio CD sound to the computer's audio chipset via CN2. PCs today use a standard four-pin cable; however, earlier cards and drives used connectors with three to six pins.

2.2.2.2 Audio Connector (CN4)

PCM-9588 supports Line-in, Line-out, Mic-in and speaker out (R/L) and it is compliant with AC97. AC'97 (short for Audio Codec '97; also MC'97, short for Modem

Codec '97) is Intel Corporation's Audio "Codec" standard developed by the Intel Architecture Labs in 1997 and used mainly in motherboards, modems, and sound cards.

2.2.2.3 Power connector (CN5)

PCM-9588 can support both ATX and AT power supply and it can use different power cable make the choice.

1. ATX power supply: you need to use ATX power cable (PN: 1700001112 WIRE ATX-20P(M)/12P(F)+3P-2.0MM 15CM)

   ATX: 5 V STB, +5 V ±5%, ±12 V ±5%, external 12 V option for LCD Inverter, PCI & PCI-104 Plus.

2. AT power supply: you need to use AT power cable (PN: 1700006196 AT Power Cable 12P/Big 4P*2 10cm)

   AT: 5 V only to boot up, external 12 V option for LCD Inverter, PCI & PC/104 Plus.

2.2.2.4 Inverter connector (CN6)

PCM-9588 can provide +5V and +12V and signal to LCD inverter board via CN6.

2.2.2.5 VGA connector (CN8)

The DB15-pin female connector is provided for video monitors.

2.2.2.6 LVDS connector (CN9)

Low-voltage differential signaling, or LVDS, is an electrical signaling system that can run at very high speeds over inexpensive twisted-pair copper cables. LVDS is a differential signaling system, which means that it transmits two different voltages which are compared at the receiver. LVDS uses this difference in voltage between the two wires to encode the information.

CN9 is LVDS (Low Voltage Differential Signal) connector. You can connect to 48bit LVDS LCD panel via CN9.

2.2.2.7 TTL Panel Connector (CN10, CN11)

PCM-9588 support TTL LCD and CN10 is TTL Panel High bits and CN11 is Low bits Connectors.

2.2.2.8 LAN Connector (CN12)

For the LAN port, it equipped with 1 high performance ethernet port which are fully compliant with IEEE 802.3u 100Base-T. It is supported by all major network operating systems. For customer requirement, PCM-9588 also has giga LAN option and it is also fully compliant with IEEE 802.3ab 1000Base-T.

2.2.2.9 HDD LED and POWER LED connector (CN13)

CN13 is a front panel connector to indicate power and HDD status.

2.2.2.10 LPT/FDD Connector (CN15)

PCM-9588 can support LPT or Floppy via CN15. LPT (Line Print Terminal) is the original, yet still common, name of the parallel port interface on IBM PC-compatible computers. It was designed to operate a text printer that used IBM's 8-bit extended ASCII character set.

2.2.2.11 IDE Connector (CN16)

The board provides 1 IDE channel, and is designed for one Enhanced Integrated Device Electronics hard disk drive or CDROM to the board's internal controller and one CF card. The IDE controller uses a PCI interface.

This advanced IDE controller supports faster data transfer, PIO mode 4, Multi-word DMA mode 2 and an Ultra ATA-133 interface.

How to connect the hard drive to CN16

1. Connect one end of the cable to CN16. Make sure that the red (or blue) wire corresponds to pin 1 on the connector, which is labeled on the board (on the right side).
2. Plug the other end of the cable into the Enhanced IDE hard drive, with pin 1 on the cable corresponding to pin 1 on the hard drive.

2.2.2.12 PC-104 plus connector (CN17)

PCM-9588 support PC-104 plus. It includes PCI and ISA interface and follow PC-104 standard. It is intended for industrial embedded computing environments where applications depend on reliable data acquisition

2.2.2.13 COM port connector (CN19, CN41)

COM is the original, yet still common, name of the serial port interface on IBM PC-compatible computers.PCM-9588 can support 4 RS-232 ports (CN19) and 2 RS-422/485 (CN41).

2.2.2.14 USB connectors (CN20, CN28, CN38)

The board provides up to 6* USB (Universal Serial Bus) ports. This gives complete Plug and Play, and hot attach/detach for up to 127 external devices. The USB interfaces comply with USB specification Rev. 2.0 which supports 480Mbps transfer rate, and are fuse protected.

2.2.2.15 Reset Button Connector (CN22)

CN22 is for system reset button. System reset clears any pending errors or events and bring a system to normal condition or initial state.

2.2.2.16 Power button connector (CN23)

CN23 is 2 pin wafer type connector and support to turn on/off system.

2.2.2.17 SIR connector (CN24)

The board can support IrDA function (optional by request). The function is shared from COM2 and data transfer rate is up to 115kbps.

2.2.2.18 PS/2 keyboard and mouse connector (CN25)

PCM-9588 can support PS/2 keyboard and mouse via CN25. The PS/2 connector is used for connecting some keyboards and mouse to a PC compatible computer system. Its name comes from the IBM Personal System/2 series of personal computers, with which it was introduced in 1987. The PS/2 mouse connector generally replaced the older DE-9 RS-232 "serial mouse" connector, while the keyboard connector replaced the larger 5-pin DIN used in the IBM PC/AT design.

2.2.2.19 CF TYPE I/II connector (CN26)

CompactFlash (CF) is a mass storage device format used in portable electronic devices. For storage, CompactFlash typically uses flash memory in a standardized enclosure. PCM-9588 has s CF slot that supports CompactFlash card type I/II.

2.2.2.20 **-V5 and -V12 connector (CN27)**

CN27 is a wafer type 3-pin connector for -V5 and -V12.

2.2.2.21 **DDR2 SODIMM Socket (CN29)**

A SO-DIMM, or small outline dual in-line memory module, is a type of computer memory built using integrated circuits.PCM-9588 has 1 x 200 pin SO-DIMM and can support memory size up to 2GB.

2.2.2.22 **DVI interface connector (CN30)**

PCM-9588 can support one DVI by optional. The Digital Visual Interface (DVI) is a video interface standard designed to maximize the visual quality of digital display devices such as flat panel LCD computer displays and digital projectors. It is designed for carrying uncompressed digital video data to a display. It is partially compatible with the High-Definition Multimedia Interface (HDMI) standard in digital mode (DVI-D).

2.2.2.23 **SATA Connector (CN31 and CN32)**

PCM-9588 supports Serial ATA via CN31 and CN32. Data transfer rates up to 150 MB/s, enabling very fast data and file transfer, and independent DMA operation on two ports.

The Serial Advanced Technology Attachment computer bus has the primary function of transferring data between the motherboard and mass storage devices (such as hard disk drives and optical drives) inside a computer.

2.2.2.24 **LAN LED connector (CN34)**

CN34 is a connector for LAN indication LED.

LED1: Off for 10M LAN, Green for 100M LAN.

LED2: On for Link, flash for active.

2.2.2.25 **GPIO connector (CN36 and CN37)**

GPIO is General Purpose Input Output. PCM-9588 supports 16-bit programmable I/O via CN36 and CN37. These GPIO pin can be programmed as data input pin or output control signal pin to control device.

2.3 Mechanical

2.3.1 Jumper and Connector Locations
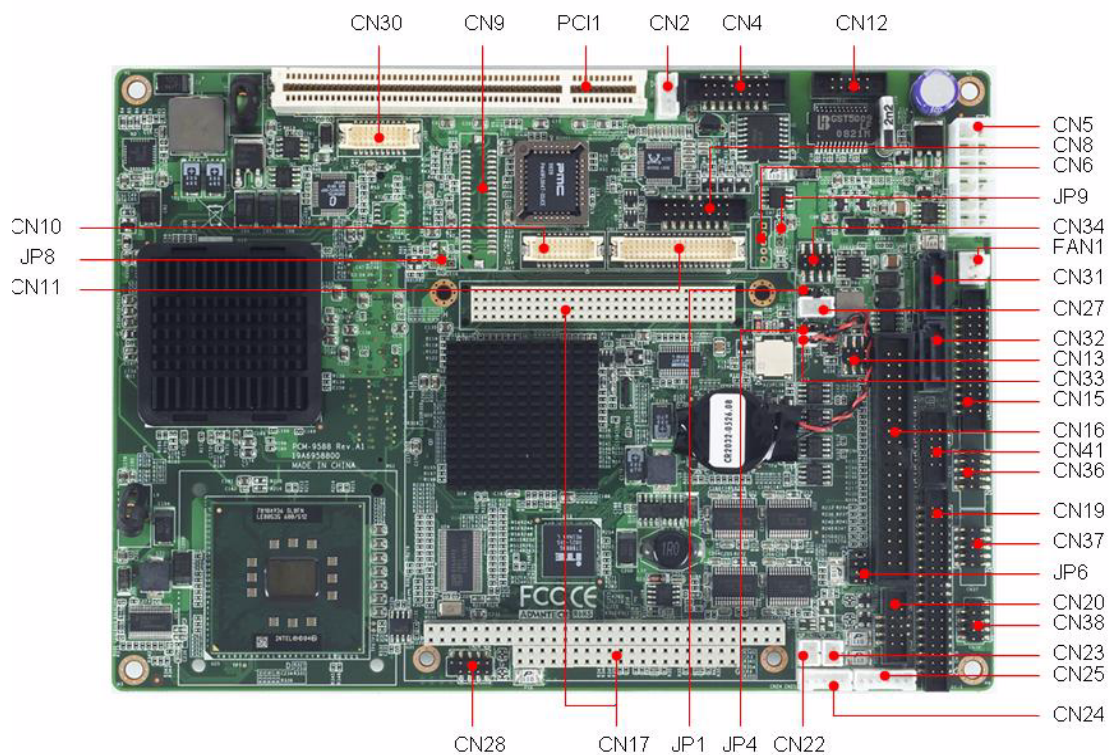
Figure 2.1 Jumper and Connector Layout (Component Side)
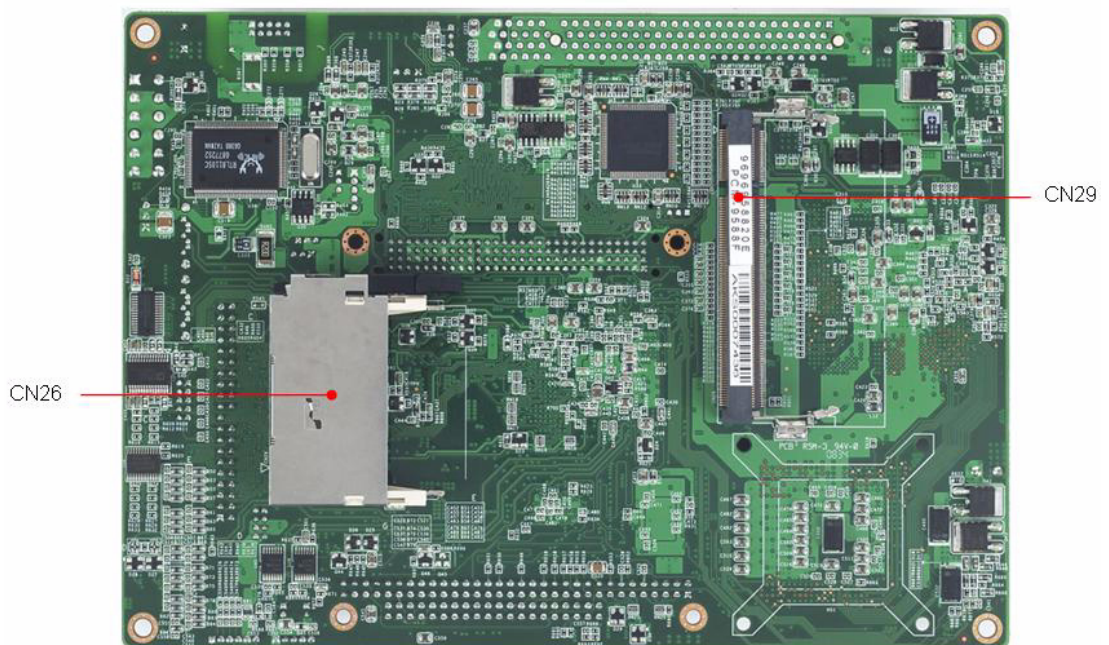
Figure 2.2 Jumper and Connector Layout (Solder Side)

2.3.2 Board Dimensions
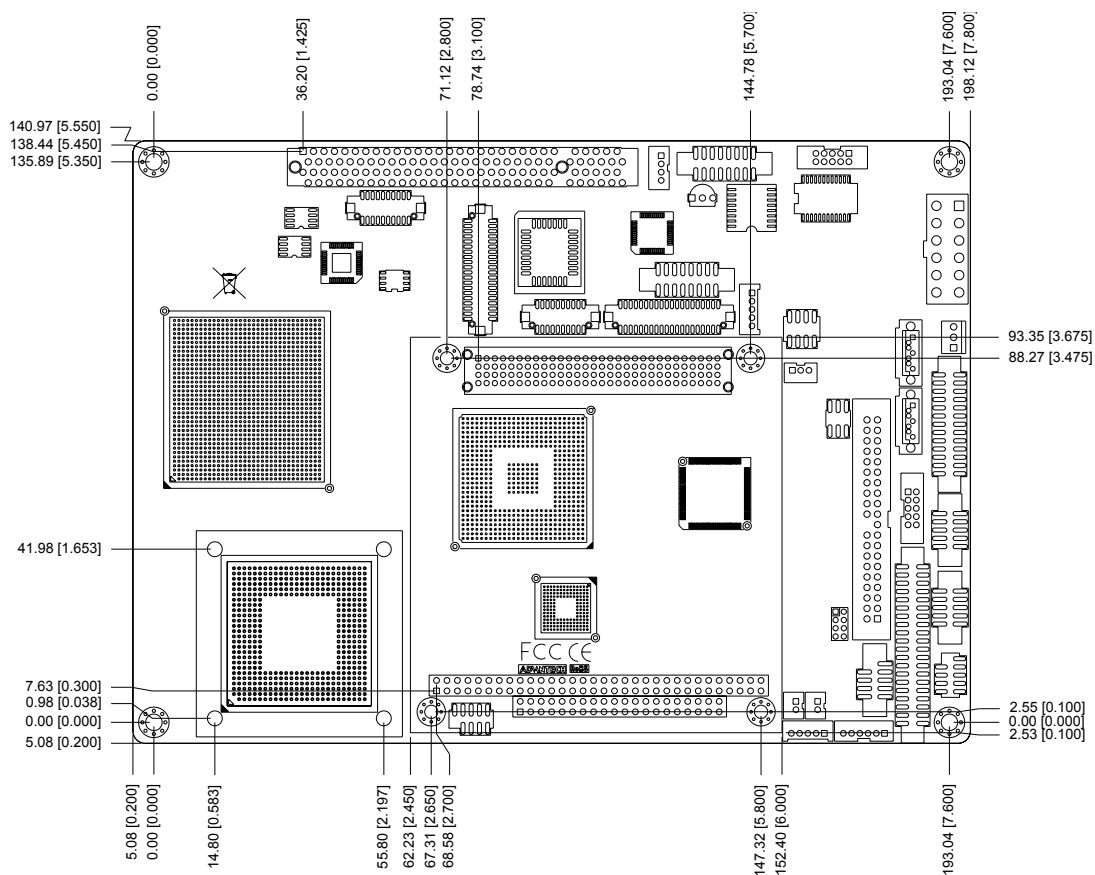
Figure 2.3 Board Dimension Layout (Component Side)
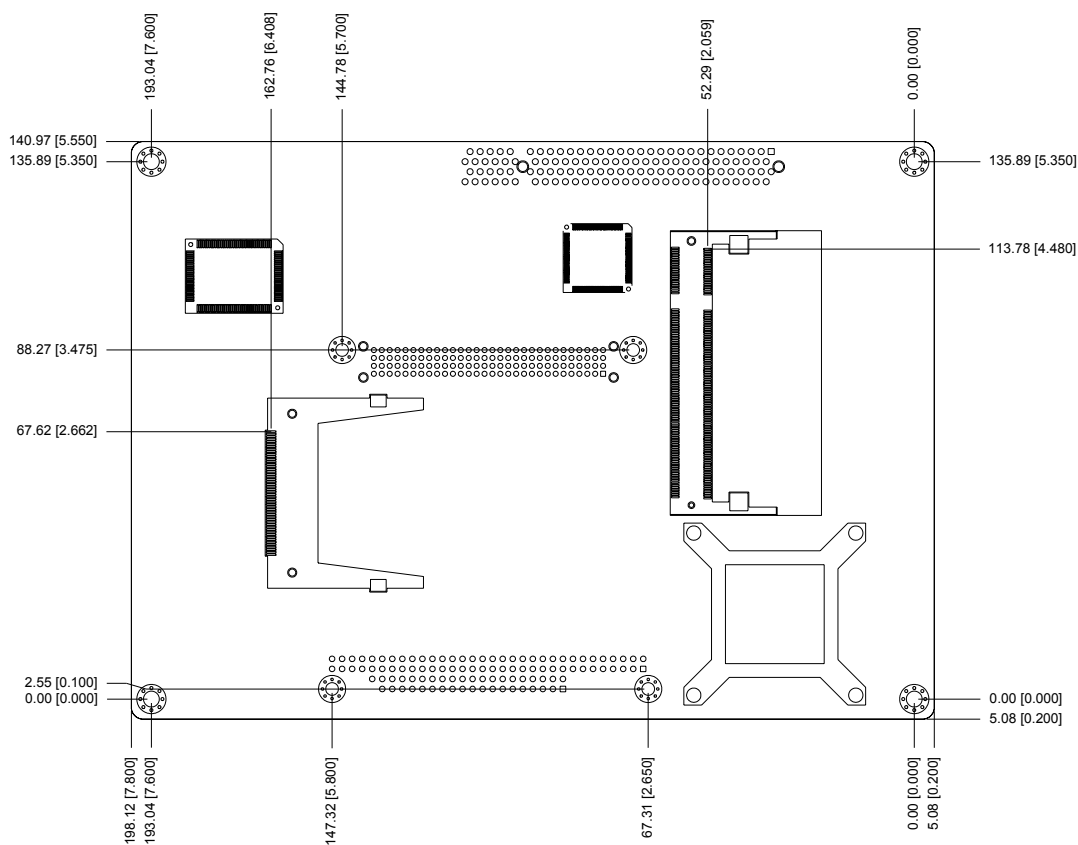
Figure 2.4 Board Dimension Layout (Solder Side)

Chapter 3

BIOS Operation

3.1 BIOS Introduction

Advantech provides the full-featured AwardBIOS 6.0 which delivers superior performance, compatibility and functionality that manufactures of Industrial PC and Embedded boards demand; it's many options and extensions let you customize your products to a wide range of applications and target markets.

The modular, adaptable AwardBIOS 6.0 supports the broadest range of processors, third-party peripherals and popular chipsets including: Intel, AMD, nVidia, and VIA processors, from 386 through Pentium, and AMD Geode to K7 and K8. Advantech also provides utilities to easily select and install features that suit the customers' own designs.

> **Note!** *Different BIOS versions maybe have somewhat different functions; a standardized BIOS operation guide is shown here.*

3.2 BIOS Setup

The PCM-9588 Series system has a built-in AwardBIOS with a CMOS SETUP utility which allows the user to configure required settings or to activate certain system features.

The CMOS SETUP saves the configuration in the CMOS RAM of the motherboard. When the power is turned off, the battery on the board supplies the necessary power to the CMOS RAM so that settings are retained.

When the power is turned on, pressing the <Del> button during the BIOS POST (Power-On Self Test) will take you to the CMOS SETUP screen.

CONTROL KEYS

< ↑ >< ↓ >< ← >< → >	Move to select item
<Enter>	Select Item
<Esc>	Main Menu - Quit and not save changes into CMOS
	Sub Menu - Exit current page and return to Main Menu
<Page Up/+>	Increase the numeric value or make changes
<Page Down/->	Decrease the numeric value or make changes
<F1>	General help, for Setup Sub Menu
<F2>	Item Help
<F5>	Load Previous Values
<F7>	Load Optimized Default
<F10>	Save all CMOS changes

3.2.1 Main Menu

Press <Del> to enter AwardBIOS CMOS Setup Utility, the Main Menu will appear on the screen. Use arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.
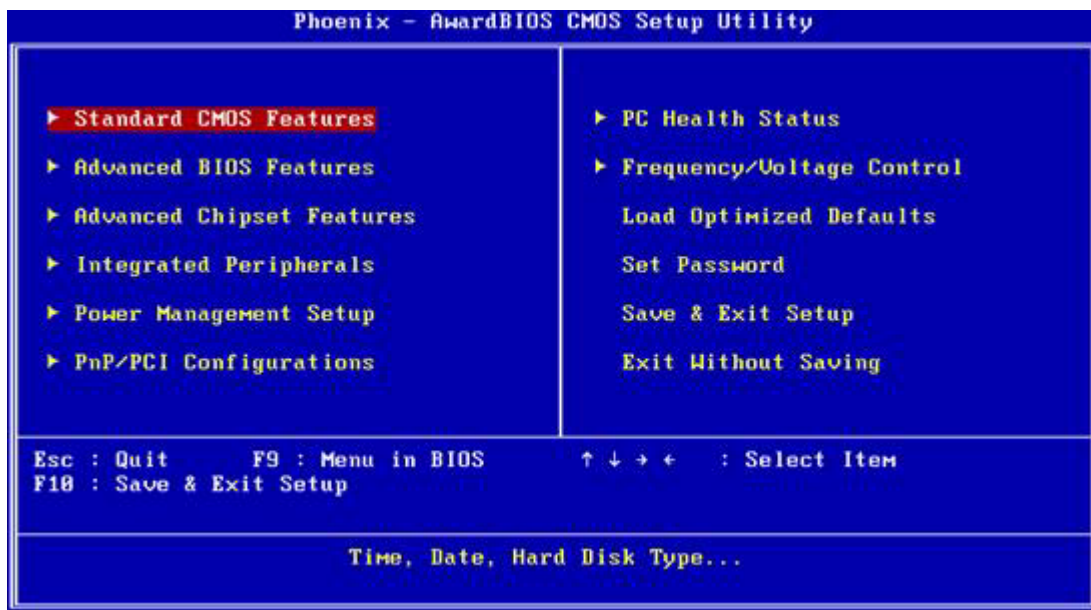
- ■ **Standard CMOS Features**
  This setup page includes all the items in standard compatible BIOS.
- ■ **Advanced BIOS Features**
  This setup page includes all the items of Award BIOS enhanced features.
- ■ **Advanced Chipset Features**
  This setup page includes all the advanced chipset configuration features.
- ■ **Integrated Peripherals**
  This setup page includes all onboard peripheral devices.
- ■ **Power Management Setup**
  This setup page includes all the items of Power Management features.
- ■ **PnP/PCI Configurations**
  This setup page includes PnP OS and PCI device configuration.
- ■ **PC Health Status**
  This setup page includes the system auto-detect CPU and system temperature, voltage, fan speed.
- ■ **Frequency/Voltage Control**
  This setup page includes CPU host clock control, frequency ratio and voltage.
- ■ **Load Optimized Defaults**
  This option allows loading of system optimized values, for best-performance configuration.
- ■ **Set Password**
  Establish, change or disable password.
- ■ **Save & Exit Setup**
  Save CMOS value settings to CMOS and exit BIOS setup.
- ■ **Exit Without Saving**
  Abandon all CMOS value changes, and exit BIOS setup.

3.2.2 Standard CMOS Features

```
         Phoenix - AwardBIOS CMOS Setup Utility
                 Standard CMOS Features
┌─────────────────────────────────────────────┬──────────────────────┐
│  Date (mm:dd:yy)        Thu, Dec 11 2008     │     Item Help        │
│  Time (hh:mm:ss)         16 :  6 :  0        ├──────────────────────┤
│                                              │  Menu Level   ▶      │
│ ▶ IDE Channel 0 Master                       │                      │
│ ▶ IDE Channel 0 Slave                        │  Change the day, month,│
│ ▶ IDE Channel 1 Master                       │  year and century    │
│ ▶ IDE Channel 1 Slave                        │                      │
│                                              │                      │
│  Drive A               [None]                │                      │
│                                              │                      │
│  Video                 [EGA/VGA]             │                      │
│  Halt On               [All Errors]          │                      │
│                                              │                      │
│  Base Memory                 640K            │                      │
│  Extended Memory           15360K            │                      │
│  Total Memory              16384K            │                      │
│                                              │                      │
│                                              │                      │
└─────────────────────────────────────────────┴──────────────────────┘
↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
           F5:Previous Values              F7: Optimized Defaults
```

■ **Date**

The date format is <weekday>, <month>, <day>, <year>.

Weekday	From Sun to Sat, determined and display by BIOS only
Month	From Jan to Dec.
Day	From 1 to 31
Year	From 1999 through 2098

■ **Time**

The times format in <hour> <minute> <second>, base on the 24-hour time.

■ **IDE Channel 0 Master/Slave**

IDE HDD Auto-Detection Press "Enter" for automatic device detection.

■ **IDE Channel 1 Master/Slave**

IDE HDD Auto-Detection Press "Enter" for automatic device detection.

■ **Drive A**

The Item identifies the types of floppy disk drive.

None	No floppy drive installed
360K, 5.25"	5.25 inch PC-type standard drive; 360K byte capacity
1.2M, 5.25"	5.25 inch AT-type high-density drive; 1.2M byte capacity
720K, 3.5"	3.5 inch double-sided drive; 720K byte capacity
1.44M, 3.5"	3.5 inch double-sided drive; 1.44M byte capacity
2.88M, 3.5"	3.5 inch double-sided drive; 2.88M byte capacity

■ **Base Memory**

The POST of the BIOS will determine the amount of base (or conventional) memory installed in the system.

■ **Extended Memory**

The POST of the BIOS will determine the amount of extended memory (above 1MB in CPU's memory address map) installed in the system.

■ **Total Memory**

This item displays the total system memory size.

3.2.3 Advanced BIOS Features

```
            Phoenix - AwardBIOS CMOS Setup Utility
                   Advanced BIOS Features
┌─────────────────────────────────────────┬──────────────────┐
│  ▶ CPU Feature            [Press Enter]  ▲ │    Item Help     │
│  ▶ Hard Disk Boot Priority [Press Enter]   │                  │
│    Virus Warning          [Disabled]       │ Menu Level  ▶    │
│    CPU L1 & L2 Cache       [Enabled]       │                  │
│    CPU L3 Cache            [Enabled]       │                  │
│    Hyper-Threading Technology[Enabled]     │                  │
│    Quick Power On Self Test  [Enabled]     │                  │
│    USB Flash Disk Type     [Auto]          │                  │
│    First Boot Device       [Floppy]        │                  │
│    Second Boot Device      [CDROM]         │                  │
│    Third Boot Device       [Hard Disk]     │                  │
│    Boot Other Device       [Enabled]       │                  │
│    Boot Up Floppy Seek     [Disabled]      │                  │
│    Boot Up NumLock Status  [On]            │                  │
│    Gate A20 Option         [Fast]          │                  │
│    Typematic Rate Setting  [Disabled]      │                  │
│  x Typematic Rate (Chars/Sec) 6            │                  │
│  x Typematic Delay (Msec)    250           │                  │
│    Security Option         [Setup]       ▼ │                  │
├─────────────────────────────────────────┴──────────────────┤
│ ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help │
│          F5:Previous Values           F7: Optimized Defaults │
└────────────────────────────────────────────────────────────┘
```

■ **CPU Feature**

This item allows user to adjust CPU features, CPU ratio, VID and Thermal and special feature like XD flag.

■ **Hard Disk Boot Priority**

This item allows user to select boot sequence for system device HDD, SCSI, RAID.

■ **Virus Warning   [Disabled]**

This item allows user to choose the VIRUS Warning feature for IDE Hard Disk boot sector protection.

■ **CPU L1 & L2 Cache [Enabled]**

This item allows user to enable CPU L1 cache and L2 cache.

■ **CPU L3 Cache [Enabled]**

This item allows user to enable CPU L3 cache.

■ **Hyper-Threading Technology [Enabled]**

This item allows user to enable supported on the Intel? Pentium? 4 Processor with HT Technology.

■ **Quick Power On Self Test   [Enabled]**

This field speeds up the Power-On Self Test (POST) routine by skipping retesting a second, third and forth time. Setup setting default is enabled.

■ **USB Flash Disk Type**

Auto	The USB flash drive type will be detected by BIOS.
HDD	The USB flash drive will be treated like a hard drive.
Floppy	The USB flash drive will be treated like a bootable floppy disk.

■ **First / Second / Third / Other Boot Drive**

Floppy	Assign this boot device priority to Floppy.
LS120	Assign this boot device priority to LS120.
Hard Disk	Assign this boot device priority to Hard Disk.
CDROM	Assign this boot device priority to CDROM.
ZIP	Assign this boot device priority to ZIP.
USB-FDD	Assign this boot device priority to USB-FDD.
USB-ZIP	Assign this boot device priority to USB-ZIP.
USB-CDROM	Assign this boot device priority to USB-CDROM.
USB-HDD	Assign this boot device priority to USB-HDD.
LAN	Assign this boot device priority to LAN.
Disabled	Disable this boot function.

■ **Boot Up Floppy Seek   [Disabled]**
When enabled, the BIOS will seek the floppy "A" drive one time.

■ **Boot Up NumLock Status   [Disabled]**
This item enables users to activate the Number Lock function upon system boot.

■ **Boot Up NumLock Status[Enabled]**
This item enables users to activate the Number Lock function upon system boot

■ **Gate A20 Option   [Fast]**
This item enables users to switch A20 control by port 92 or not.

■ **Typematic Rate Setting**
This item enables users to set the two typematic controls items.
This field controls the speed at
– Typematic Rate (Chars/Sec)
  This item controls the speed at which the system auto-repeats keystrokes.
  Eight settings are 6, 8, 10, 12, 15, 20, 24 and 30.
– Typematic Delay (Msec)
  This item sets the keypress time interval before auto-repeat begins. The delay rate options are 250, 500, 750 and 1000.

■ **Security Option   [Setup]**

System	System requires password both for bootup and for access to the Setup page..
Setup	System requires password only for access to the Setup page, not for bootup. (Default value)

■ **APIC Mode [Enabled]**
This item allows user to enabled of disabled "Advanced Programmable Interrupt Controller". APIC is implemented in the motherboard and must be supported by the operating system, and it extends the number of IRQ's available.

■ **MPS Version Control for OS   [1.4]**
This item sets the operating system multiprocessor support version.

■ **OS Select For DRAM > 64 M   [Non-OS2]**
Select OS2 only if system is running OS/2 operation system with greater than 64 MB of RAM on the system.

3.2.4 Advanced Chipset Features

```
            Phoenix - AwardBIOS CMOS Setup Utility
                    Advanced Chipset Features

  DRAM Timing Selectable    [By SPD]          ┌──────────────────┐
  CAS Latency Time          [Auto]            │    Item Help     │
  DRAM RAS# to CAS# Delay   [Auto]            │                  │
  DRAM RAS# Precharge       [Auto]            │ Menu Level   ▶   │
  Precharge dealy (tRAS)    [Auto]            │                  │
  System Memory Frequency   [Auto]            │                  │
  SLP_S4# Assertion Width   [4 to 5 Sec.]     │                  │
  System BIOS Cacheable     [Enabled]         │                  │
  Video  BIOS Cacheable     [Disabled]        │                  │
  Memory Hole At 15M-16M    [Disabled]        │                  │
                                              │                  │
  ** VGA Setting **                           │                  │
  PEG/Onchip VGA Control    [Auto]            │                  │
  PEG Force X1              [Disabled]        │                  │
  On-Chip Frame Buffer Size [ 8MB]            │                  │
  DVMT Mode                 [DVMT]            │                  │
  DVMT/FIXED Memory Size    [ 128MB]          │                  │
  Panel Type                [1024x768 LVDS]   │                  │
  Boot Display              [CRT]             └──────────────────┘

 ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
              F5:Previous Values            F7: Optimized Defaults
```

> **Note!** This "Advanced Chipset Features" option controls the configuration of the board's chipset; items on this page depend on the chipset installed. It is strongly recommended only technical users make changes to the default settings.

■ **DRAM Timing Selectable   [By SPD]**

This item enables users to set the optimal timings for items 2 through 5, system default setting of "By SPD" to follow the SPD information and ensure the system running in stable and optimal performance.

■ **CAS Latency Time   [Auto]**

This item enables users to set the timing delay in clock cycles before SDRAM start a read command after receiving it.

■ **DRAM RAS# to CAS# Delay   [Auto]**

This item enables users to set the timing of the transition from RAS (row address strobe) to CAS (column address strobe) as both rows and column are separately addressed shortly after DRAM is refreshed.

■ **DRAM RAS# Precharge   [Auto]**

This item enables users to set the DRAM RAS# precharge timing, system default is setting to "Auto" to reference the data from SPD ROM.

■ **Precharge delay (tRAS)   [Auto]**

This item allows user to adjust memory precharge time

■ **System Memory Frequency   [Auto]**

This item allows user to adjust memory frequency to improvement performance.

■ **SLP_S4# Assertion Width   [4 to 5 Sec]**

This item allow user to set the SLP_S4# Assertion Width.

■ **System BIOS Cacheable   [Enabled]**

This item allows the system BIOS to be cached to allow faster execution and better performance.

■ **Video BIOS Cacheable   [Disabled]**

This item allows the video BIOS to be cached to allow faster execution and better performance.

- **Memory Hole At 15M-16M   [Disabled]**

  This item reserves 15MB-16MB memory address space to ISA expansion cards that specifically require the setting. Memory from 15MB-16MB will be unavailable to the system because of the expansion cards can only access memory at this area.

- **PEG/Onboard VGA Control   [Auto]**

  This item allows the user to select whether onboard graphics processor or the PCI Express card.

- **PEG Force X1   [Disabled]**

  This item allows the user to covert a PCI Express X16 slot to PCI Express X1 slot.

- **On-Chip Frame Buffer Size   [8MB]**

  This item allows the user to adjust on-chip graphics of memory buffer.

- **DVMT Mode   [DVMT]**

  This item allows the user to adjust Intel's Dynamic Video Memory Technology (DVMT).Bios provide three option to choose (DVMT,FIXED and Both).

- **DVMT/FIXED Memory Size   [128MB]**

  This item allows the user to adjust DVMT/FIXED graphics memory size.

- **Panel Type   [1024X768 LVDS]**

  This item allows the user to adjust panel resolution.

- **Boot Display   [CRT]**

  This item allows the user to decide that display mode.

  Selection item

  > [CRT]
  > [LFP]
  > [CRT+LFP]
  > [CRT+LFP2] : This is for CRT +DVI display

3.2.5 Integrated Peripherals

```
          Phoenix - AwardBIOS CMOS Setup Utility
                    Integrated Peripherals

  ▶ OnChip IDE Device          [Press Enter]         Item Help
  ▶ Onboard Device             [Press Enter]
  ▶ SuperIO Device             [Press Enter]       Menu Level    ▶




 ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
             F5:Previous Values            F7: Optimized Defaults
```
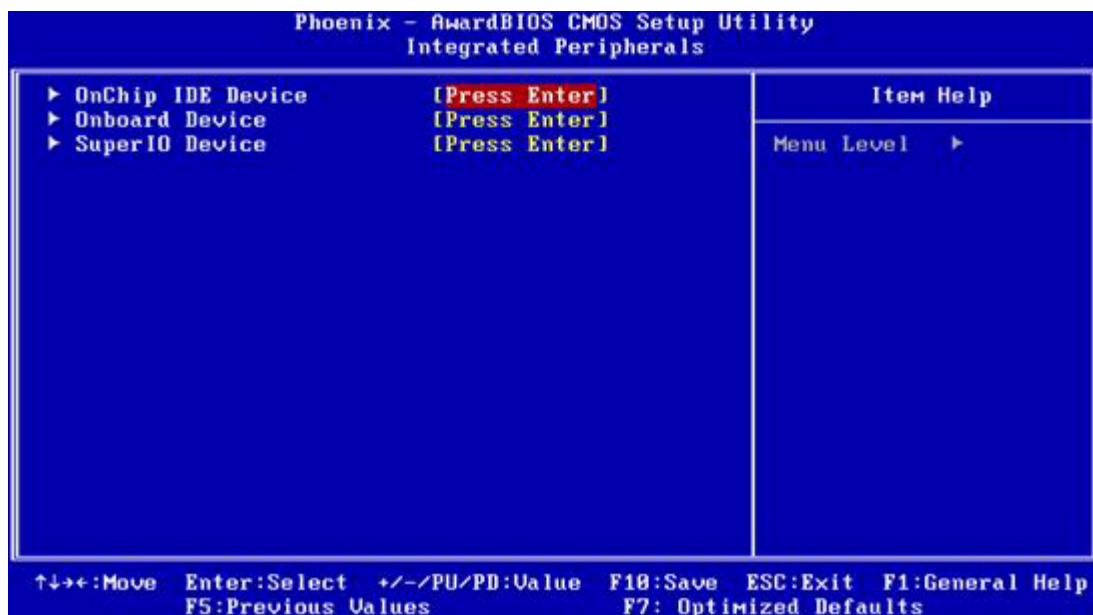
> **Note!**   *This "Integrated Peripherals" option controls the configuration of the board's chipset, includes IDE, ATA, SATA, USB, AC97, MC97 and Super IO and Sensor devices; this page may vary according to the chipset installed.*

■ **OnChip IDE Device**

This item enables users to set the OnChip IDE device status, includes enable IDE devices and setting PIO and DMA access mode, and some of new chipset also support for SATA device (Serial-ATA)

■ **Onboard Device**

This item enables users to set the Onboard device status, includes enable USB, AC97, MC97 and LAN devices.

■ **Super IO Device**

This item enables users to set the Super IO device status, includes enable Floppy, COM, LPT, IR and control GPIO and Power fail status.

```
                    Phoenix - AwardBIOS CMOS Setup Utility
                                  SuperIO Device

    Onboard FDC Controller      [Enabled]        ▲       Item Help
    Onboard Serial Port 1       [3F8]
    Serial Port 1 Use IRQ       [IRQ3]                 Menu Level   ▶▶
    Onboard Serial Port 2       [3E8]
    Serial Port 2 Use IRQ       [IRQ4]
    UART Mode Select            [Normal]
    RxD , TxD Active            [Hi,Lo]
    IR Transmission Delay       [Enabled]
    UR2 Duplex Mode             [Half]
    Onboard Serial Port 3       [2F8]
    Serial Port 3 Use IRQ       [IRQ5]
    Onboard Serial Port 4       [2E8]
    Serial Port 4 Use IRQ       [IRQ10]
    Onboard Serial Port 5       [2F0]
    Serial Port 5 Use IRQ       [IRQ9]
    Onboard Serial Port 6       [2E0]
    Serial Port 6 Use IRQ       [IRQ11]
    Onboard Parallel Port       [378/IRQ7]
    Parallel Port Mode          [Standard]       ▼

    ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
             F5:Previous Values               F7: Optimized Defaults
```

■ **Onboard Serial port 1 [3F8]**
 This item allows user to adjust serial port 1 address.

■ **Serial port 1 Use IRQ [IRQ3]**
 This item allows user to adjust serial port 1 IRQ.

■ **Onboard Serial port 2 [3E8]**
 This item allows user to adjust serial port 2 address.

■ **Serial port 2 Use IRQ [IRQ4]**
 This item allows user to adjust serial port 2 IRQ.

■ **Serial port 3 [2F8]**
 This item allows user to adjust serial port 3 address.

■ **Serial 3 IRQ [IRQ5]**
 This item allows user to adjust serial port 3 IRQ.

■ **Serial port 4 [2E8]**
 This item allows user to adjust serial port 4 address.

■ **Serial 4 IRQ [IRQ7]**
 This item allows user to adjust serial port 4 IRQ.

■ **Serial port 5 [2E0]**
 This item allows user to adjust serial port 5 address.

■ **Serial 5 IRQ [IRQ10]**
 This item allows user to adjust serial port 5 IRQ.

■ **Serial port 6 [2F0]**
 This item allows user to adjust serial port 6 address.

■ **Serial 6 IRQ [IRQ11]**
 This item allows user to adjust serial port 6 IRQ.

■ **Onboard Parallel Port [378/IRQ7]**
 This item allows user to adjust parallel port address and irq.

■ **Parallel Port Mode [Standard]**
This item allows user to adjust parallel port mode.
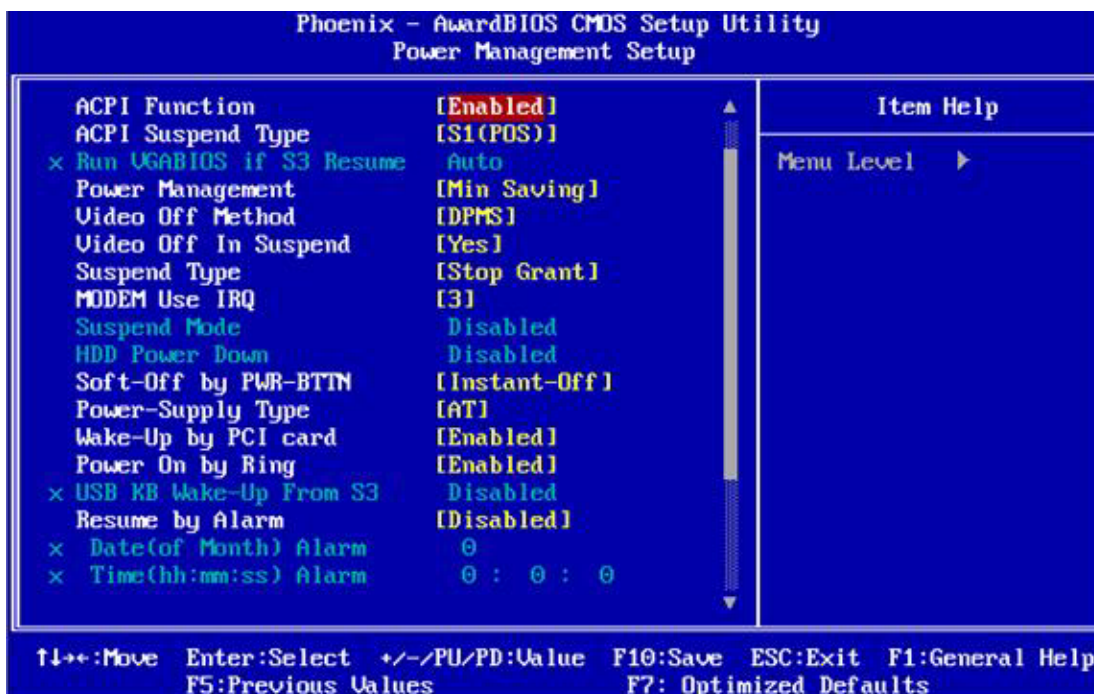
■ **ECP Mode Use DMA [3]**
This item allows user to adjust ECP DMA resource.

3.2.6 Power Management Setup

```
           Phoenix - AwardBIOS CMOS Setup Utility
                   Power Management Setup

   ACPI Function            [Enabled]              Item Help
   ACPI Suspend Type        [S1(POS)]
 x Run VGABIOS if S3 Resume  Auto           Menu Level    ▶
   Power Management         [Min Saving]
   Video Off Method         [DPMS]
   Video Off In Suspend     [Yes]
   Suspend Type             [Stop Grant]
   MODEM Use IRQ            [3]
   Suspend Mode             Disabled
   HDD Power Down           Disabled
   Soft-Off by PWR-BTTN     [Instant-Off]
   Power-Supply Type        [AT]
   Wake-Up by PCI card      [Enabled]
   Power On by Ring         [Enabled]
 x USB KB Wake-Up From S3    Disabled
   Resume by Alarm          [Disabled]
 x  Date(of Month) Alarm      0
 x  Time(hh:mm:ss) Alarm      0 :  0 :  0

 ↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
            F5:Previous Values           F7: Optimized Defaults
```

Note! *This "Power management Setup" option may be used to configure the system to most effectively energy conservation, while still operating in a manner consistent with intended computer use style.*

■ **ACPI Function   [Enabled]**
This item defines the ACPI (Advanced Configuration and Power Management) feature that makes hardware status information available to the operating system, and communicate PC and system devices for improving the power management.

■ **ACPI Suspend Type   [S1 (POS)]**
This item allows user to select sleep state when suspend.

| S1 (POS) | The suspend mode is equivalent to a software power down. |
| S3 (STR) | The system shuts down with the exception of a refresh current to the system memory. |

■ **Run VGA BIOS if S3 Resume   [Auto]**
This item allows system to re-initialize VGA BIOS after system resumes from ACPI S3 mode.

■ **Power Management   [Min Saving]**
This item allows user to select system power saving mode.

| Min Saving | Minimum power management. Suspend Mode=1 hr. |
| Max Saving | Maximum power management. Suspend Mode=1 min. |

| User Define | Allows user to set each mode individually. |
| | Suspend Mode= Disabled or 1 min ~1 hr. |

■ **HDD Power Down   [Disabled]**

This item allows user to determine the time of system inactivity, the hard disk drive will be powered down.

Mode= Disabled or 1 min ~ 15 min

■ **Video Off Method   [DPMS]**

This item allows user to determine the manner is which the monitor is blanked.

V/H SYNC+Blank	This option will cause system to turn off vertical and horizontal synchronization ports and write blanks to the video buffer.
Blank Screen	This option only writes blanks to the video buffer.
DPMS	Initial display power management signaling.

■ **Video Off In Suspend [Yes]**

This item allows user to turn off video during system enter suspend mode.

■ **Suspend Type [Stop Grant]**

This item allows user to determine the suspend type.

■ **Modem use IRQ [3]**

This item allows user to determine the IRQ which the MODEM can use.

■ **Suspend Mode [1 Hour]**

This item allows user to determine the time of system inactivity, all devices except the CPU will be shut off.

■ **HDD Power Down Mode [15 Min]**

This item allows user to determine the time of system inactivity, the hard disk drive will be powered down.

■ **Soft-Off by PWR-BTTN [Enabled]**

This item allows user to define function of power button.

| Instant-Off | Press power button then Power off instantly. |
| Delay 4 Sec | Press power button 4 sec. to Power off. |

■ **Wake-Up by PCI card [Enabled]**

This item allows user to defines PCI cards to wake up the system from the suspend mode.

■ **Power On by Ring [Enabled]**

This item allows user to define the system will resume by activating of modem ring.

■ **USB KB Wake-Up From S3 [Enabled]**

This item allows user to enable using a USB keyboard, and allow a keystroke to wake up the system from power saving mode.

■ **Resume by Alarm [Disabled]**

This item allows user to enable and key in Date/time to power on system

Disabled	Disable this function.
Enabled	Enable alarm function to power on system
Data (of month) Alarm	1-31
Time (HH:MM:SS) Alarm	(0-23) : (0-59) : 0-59)

3.2.7 PnP/PCI Configurations

```
        Phoenix - AwardBIOS CMOS Setup Utility
                PnP/PCI Configurations

   Init Display First       [PCI Slot]              Item Help
   Reset Configuration Data [Disabled]
                                             Menu Level  ►
   Resources Controlled By  [Auto(ESCD)]
 x IRQ Resources              Press Enter

   PCI/VGA Palette Snoop    [Disabled]

   ** PCI Express relative items **
   Maximum Payload Size     [4096]




↑↓→←:Move  Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
           F5:Previous Values            F7: Optimized Defaults
```

> **Note!** This "PnP/PCI Configurations" option sets up the IRQ and DMA (both PnP and PCI bus assignments).

- **Init Display First [PCI Slot]**
  This item is setting for start up Video output from PCI or Onboard device.
- **Reset Configuration Data [Disabled]**
  This item allow user to clear any PnP configuration data stored in the BIOS.
- **Resources Controlled By [Auto (ESCD)]**
  - IRQ Resources
    This item allows you respectively assign an interruptive type for IRQ-3, 4, 5, 7, 9, 10, 11, 12, 14, and 15.
  - DMA Resources
    This item allows you respectively assign an interruptive type for DMA, 0, 1, 2, 3, 4, 5, 6, and 7.
- **PCI VGA Palette Snoop [Disabled]**
  The item is designed to solve problems caused by some non-standard VGA cards. A built-in VGA system does not need this function.

3.2.8 PC Health Status

```
            Phoenix - AwardBIOS CMOS Setup Utility
                        PC Health Status

   Shutdown Temperature      [Disabled]              Item Help
   Current CPU Temperature
   CPU Voltage                                  Menu Level    ▶
   3.3 V
   2.5 V
   5 V
   12 V
   CPU FAN Speed




 ↑↓→←:Move   Enter:Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1:General Help
             F5:Previous Values              F7: Optimized Defaults
```
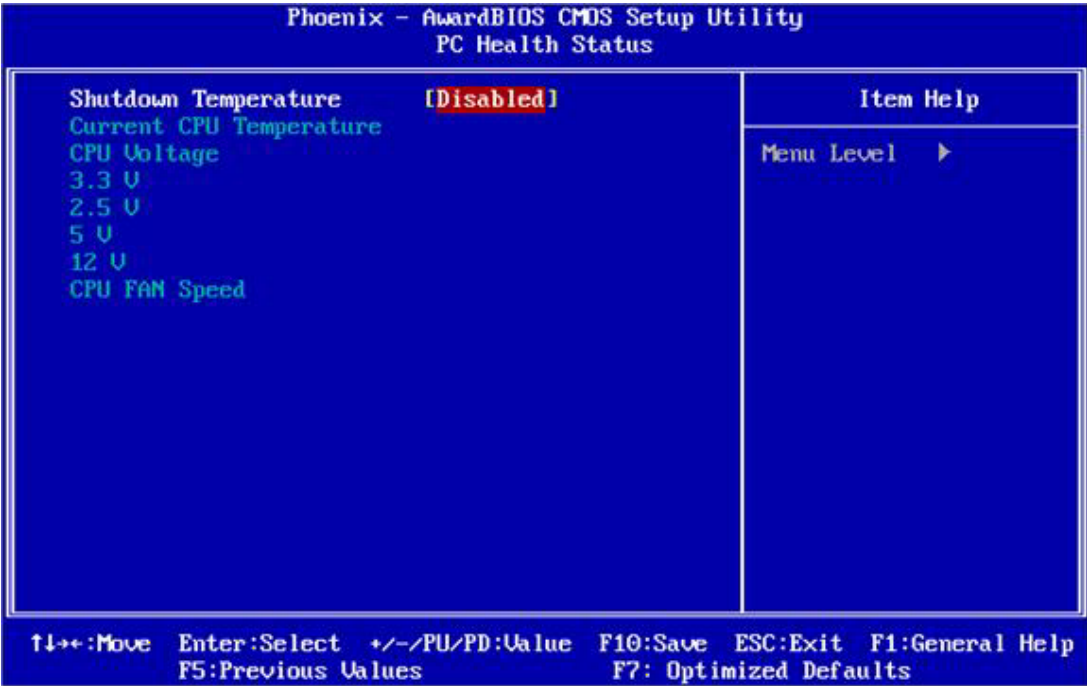
Note! This "PC Health Status" page reports the thermal, fan and voltage status
         of the board. This page may vary according to the chipset installed.

- ■ **Shutdown Temperature [Disabled]**
  This item enables users to set the limitation of CPU temperature, the range is
  from 85° C and 100° C.
- ■ **Current System/CPU Temp [Show Only]**
  This item displays current system and CPU temperature.
- ■ **2.5 V / 3.3 V / 5 V / 12 V [Show Only]**
  This item displays current CPU and system Voltage.
- ■ **CPU FAN Speed [Show Only]**
  This item displays current system FAN speed.

3.2.9 Frequency/voltage Control
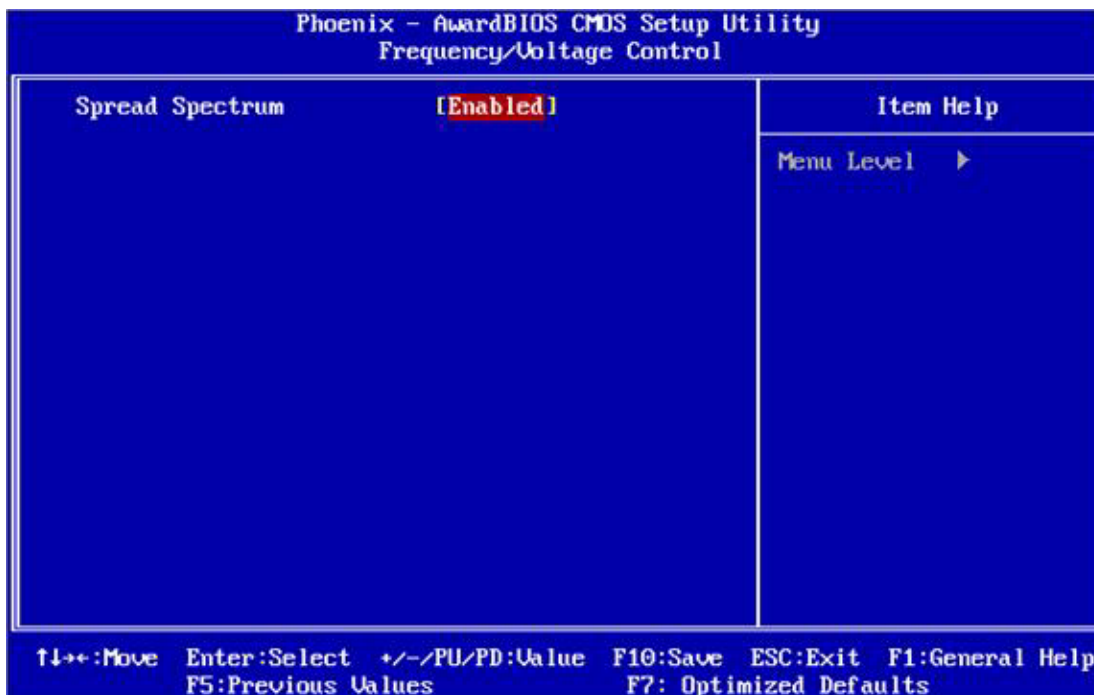
Note!

This "Frequency/Voltage Control" option controls the CPU Host and PCI frequency, this page depends on the CPU and chipset installed; some items will show up only when you install a processor which supports those functions.

■ **Spread Spectrum [Disabled]**
  This item enables users to set the spread spectrum modulation, if desired.

3.2.10 Load Optimized Defaults

> **Note!** *Load Optimized Defaults loads the default system values directly from ROM. If the stored record created by the Setup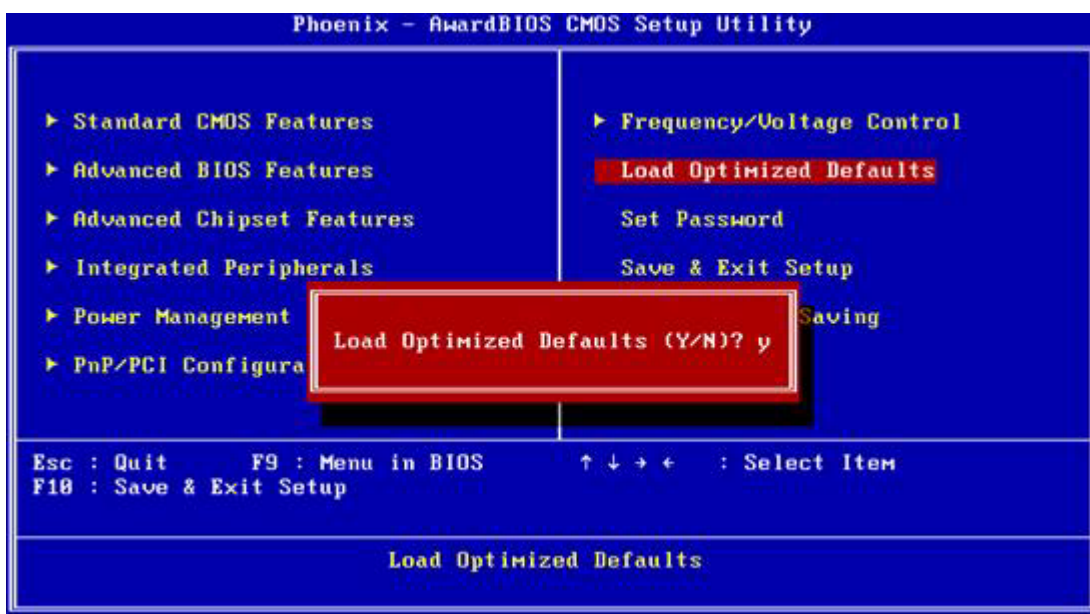 program should ever become corrupted (and therefore unusable), these defaults will load automatically when you turn PCM-9588 system on.*

3.2.11 Set Password

```
          Phoenix - AwardBIOS CMOS Setup Utility

   ▶ Standard CMOS Features         ▶ Frequency/Voltage Control

   ▶ Advanced BIOS Features            Load Optimized Defaults

   ▶ Advanced Chipset Features         Set Password

   ▶ Integrated Peripherals            Save & Exit Setup

   ▶ Power Management Setup            Exit Without Saving

   ▶ PnP/PCI Configurati  Enter Password:     *****


   Esc : Quit      F9 : Menu in BIOS      ↑ ↓ → ←   : Select Item
   F10 : Save & Exit Setup

                   Change/Set/Disable Password
```

> **Note!** *To enable this feature, you must first go to the Advanced BIOS Features menu, choose the Security Option, and select either Setup or System, depending on which aspect you want password protected. Setup requires a password only to enter Setup. System requires the password either to enter Setup or to boot the system. A password may be at most 8 characters long.*

To Establish Password

1. Choose the Set Password option from the CMOS Setup Utility main menu and press <Enter>.
2. When you see "Enter Password", enter the desired password and press <Enter>.
3. At the "Confirm Password" prompt, retype the desired password, then press <Enter>.
4. Select Save to CMOS and EXIT, type <Y>, then <Enter>.

To Change Password

1. Choose the Set Password option from the CMOS Setup Utility main menu and press <Enter>.
2. When you see "Enter Password", enter the existing password and press <Enter>.
3. You will see "Confirm Password". Type it again, and press <Enter>.
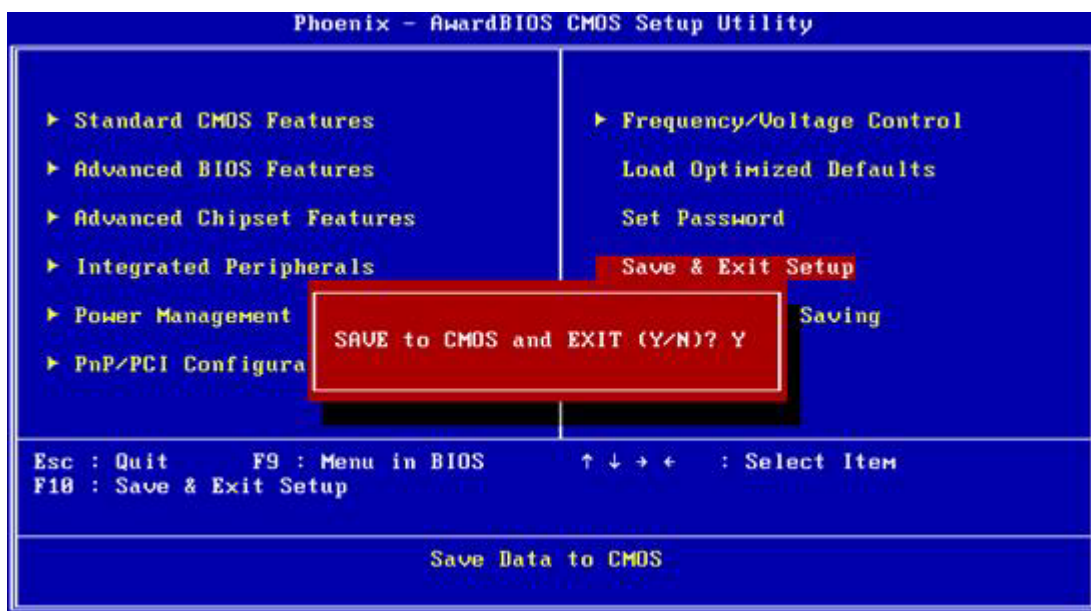4. Select Set Password again, and at the "Enter Password" prompt, enter the new password and press <Enter>.
5. At the "Confirm Password" prompt, retype the new password, and press <Enter>.
6. Select Save to CMOS and EXIT, type <Y>, then <Enter>.

To Disable Password

1. Choose the Set Password option from the CMOS Setup Utility main menu and press <Enter>.
2. When you see "Enter Password", enter the existing password and press <Enter>.
3. You will see "Confirm Password". Type it again, and press <Enter>.
4. Select Set Password again, and at the"Enter Password" prompt, please don't enter anything; just press <Enter>.
5. At the "Confirm Password" prompt, again, don't type in anything; just press <Enter>.
6. Select Save to CMOS and EXIT, type <Y>, then <Enter>.

3.2.12 Save & Exit Setup

```
              Phoenix - AwardBIOS CMOS Setup Utility

    ▶ Standard CMOS Features          ▶ Frequency/Voltage Control
    ▶ Advanced BIOS Features             Load Optimized Defaults
    ▶ Advanced Chipset Features          Set Password
    ▶ Integrated Peripherals             Save & Exit Setup
    ▶ Power Management                                   Saving
    ▶ PnP/PCI Configura    SAVE to CMOS and EXIT (Y/N)? Y


    Esc : Quit        F9 : Menu in BIOS      ↑ ↓ → ←   : Select Item
    F10 : Save & Exit Setup

                        Save Data to CMOS
```

> **Note!**   *Typing "Y" will quit the BIOS Setup Utility and save user setup value to CMOS.*
>
> *Typing "N" will return to BIOS Setup Utility.*

3.2.13 Quit Without Saving

```
        Phoenix - AwardBIOS CMOS Setup Utility

 ▶ Standard CMOS Features          ▶ Frequency/Voltage Control

 ▶ Advanced BIOS Features              Load Optimized Defaults

 ▶ Advanced Chipset Features           Set Password

 ▶ Integrated Peripherals              Save & Exit Setup

 ▶ Power Management S                           t Saving
                      Quit Without Saving (Y/N)? N
 ▶ PnP/PCI Configurat


 Esc : Quit         F9 : Menu in BIOS      ↑ ↓ → ←   : Select Item
 F10 : Save & Exit Setup

                        Abandon all Data
```
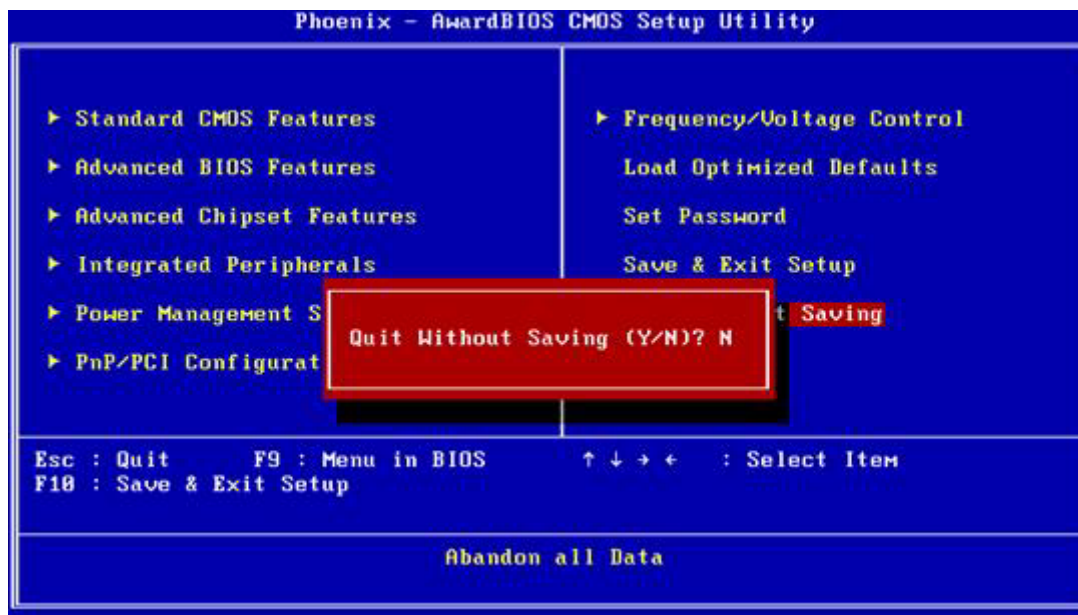
Note!   *Typing "Y" will quit the BIOS Setup Utility without saving to CMOS.*

Typing "N" will return to BIOS Setup Utility.

Chapter 4

S/W Introduction & Installation

Sections include:
- S/W Introduction
- Driver Installation
- SUSI Application Library

4.1 S/W Introduction

The mission of Advantech Embedded Software Services is to "Enhance quality of life with Advantech platforms and Microsoft Windows® embedded technology." We enable Windows® Embedded software products on Advantech platforms to more effectively support the embedded computing community. Customers are freed from the hassle of dealing with multiple vendors (hardware suppliers, system integrators, embedded OS distributors) for projects. Our goal is to make Windows® embedded software solutions easily and widely available to the embedded computing community.

4.2 Driver Installation

4.2.1 Windows XP Professional

To install the drivers please insert the CD, select the drivers that you want to install, then run .exe (set up) file under the appropriate chipset folder and follow driver setup instructions to complete the installation.

4.2.2 Other OS

To install the drivers for other Windows OSs, or Linux, please browse the CD and run the setup file under the appropriate chipset folder.

4.3 SUSI Application Library

4.3.1 SUSI Introduction

To make hardware easier and convenient for programmers to access, Advantech has released a suite of API (Application Programming Interface) in the form of a program library. The program library is called Secured and Unified Smart Interface or SUSI for short.

In modern operating systems, user space applications cannot access hardware directly. Drivers are required to access hardware. User space applications access hardware through drivers. Different operating systems usually define different interface for drivers. This means that user space applications call different functions for hardware access in different operating systems. To provide a uniform interface for accessing hardware, an abstraction layer is built on top of the drivers and SUSI is such an abstraction layer. SUSI provides a uniform API for application programmers to access the hardware functions in different Operating Systems and on different Advantech hardware platforms.

Application programmers can invoke the functions exported by SUSI instead of calling the drivers directly. The benefit of using SUSI is portability. The same set of API is defined for different Advantech hardware platforms. Also, the same set of API is implemented in different Operating Systems including Windows XP and Windows CE. This user's manual describes some sample programs and the API in SUSI. The hardware functions currently supported by SUSI can be grouped into a few categories including Watchdog, I^2C, SMBus, GPIO, and VGA control. Each category of API in SUSI is briefly described below.

4.3.2 SUSI Functions

4.3.2.1 The GPIO API

General Purpose Input/Output (GPIO) is a flexible parallel interface that allows a variety of custom connections, and supports digital I/O devices.

4.3.2.2 The I^2C API

I^2C is a bi-directional two-wire bus that was developed by Philips for use in their televisions in the 1980s and nowadays is used in various types of embedded systems.

The strict timing requirements defined in the I^2C protocol has been taken care of by SUSI. Instead of asking application programmers to figure out the strict timing requirements in the I^2C protocol, the I^2C API in SUSI can be used to control I^2C devices by invoking other function calls. SUSI provides a consistent programming interface for different Advantech boards. That means user programs using SUSI are portable among different Advantech boards as long as the boards and SUSI provide the required functionalities. Overall product development times can be greatly reduced using SUSI.

4.3.2.3 The SMBus API

The System Management Bus (SMBus) is a two-wire interface defined by Intel® Corporation in 1995. It is based on the same principles of operation of I^2C and is used in personal computers and servers for low-speed system management communications. Nowadays, it can be seen in many types of embedded systems. As with other API in SUSI, the SMBus API is available on many platforms including Windows XP and Windows CE.

4.3.2.4 The VGA Control API

There are two kinds of VGA control APIs, backlight on/off control and brightness control. Backlight on/off control allows a developer to turn on or off the backlight, and to control brightness smoothly.

4.3.2.5 The Watchdog API

A watchdog timer (abbreviated as WDT) is a hardware device which triggers an action, e.g. rebooting the system, if the system does not reset the timer within a specific period of time. The WDT API in SUSI provides developers with functions such as starting the timer, resetting the timer, and setting the timeout value if the hardware requires customized timeout values.

4.3.2.6 The Hardware Monitor API

The hardware monitor (abbreviated as HWM) is a system health supervision capability achieved by placing certain I/O chips along with sensors for inspecting the target of interests for certain condition indexes, such as fan speed, temperature and voltage etc.

However, due to the inaccuracy among many commercially available hardware monitoring chips, Advantech has developed a unique scheme for hardware monitoring - achieved by using a dedicated micro-processor with algorithms specifically designed to provide accurate, real-time and reliable data content; helping protect your system in a more reliable manner

4.3.3 SUSI Installation

SUSI supports many different operating systems. Each subsection below describes how to install SUSI and related software on a specific operating system. Please refer to the subsection matching your operating system.

4.3.3.1 Windows XP

In windows XP, you can install the library, drivers and demo programs onto the platform easily using the installation tool - **The SUSI Library Installer**. After the installer has executed, the SUSI Library and related files for Windows XP can be found in the target installation directory. The files are listed in the following table.

Directory	Contents
\Library	■ Susi.lib Library for developing the applications on Windows XP. ■ Susi.dll Dynamic library for SUSI on Windows XP.
\Demo	■ SusiDemo.EXE Demo program on Windows XP. ■ Susi.dll Dynamic library for SUSI on Windows XP.
\Demo\SRC	Source code of the demo program on Windows XP.

The following section illustrates the installation process.

Note! *The the SUSI Library Installer shown on each screen will depend on the particular version installed.*

*Note:

1. Extract **Susi.zip**.
2. Double-click the "**Setup.exe**" file.

The installer searches for a previous installation of the **SUSI Library**. If it locates one, a dialog box opens asking whether you want to **modify**, **repair** or **remove** the software. If a previous version is located, please see the section of **[Maintenance Setup]**. If one is not located, just click **Next**.

4.3.3.2 Windows CE

In windows CE, there are three ways to install the SUSI Library, you can install it manually or use Advantech CE-Builder to install the library or just copy the programs and the library onto a compact flash card.

Express Installation:

You can use Advantech CE-Builder to load the library into the image.

- First, click the My Component tab.
- In this tab, click Add New Category button to add a new category, e.g. the SUSI Library.
- Then add a new file in this category, and upload the SUSI.dll for this category.
- After these steps, select the SUSI Library category you created for every project.

Manual Installation:

You can add the SUSI Library into the image by editing any bib file.

- First open project.bib in the platform builder.
- Add this line to the MODULES section of project.bib Susi.dll $(_FLATRELEASEDIR)\Susi.dllNK SH
- If you want to run the window-based demo, add following line: SusiTest.exe $(_FLATRELEASEDIR)\SusiTest.exe
- If you want to run the console-based demo, add following lines: Watchdog.exe $(_FLATRELEASEDIR)\Watchdog.exe NK S

  GPIO.exe$(_FLATRELEASEDIR)\GPIO.exeNK S

  SMBUS.exe$(_FLATRELEASEDIR)\SMBUS.exeNK S
- Place the three files into any file directory.
- Build your new Windows CE operating system.

4.3.4 SUSI Sample Programs

4.3.4.1 Sample Programs

The sample programs demonstrate how to incorporate SUSI into your program. There are sample programs for two categories of operating system, i.e. Windows XP and Windows CE. The sample programs run in graphics mode in Windows XP and Windows CE. The sample programs are described in the subsections below.

4.3.4.2 Windows Graphics Mode

There are sample programs of Windows in graphics mode for two categories of operating system, i.e. Windows CE and Windows XP. Each demo application contains an executable file SusiDemo.exe, a shared library Susi.dll and source code within the release package. The files of Windows CE and Windows XP are not compatible with each other.

SusiDemo.exe is an executable file and it requires the shared library, Susi.dll, to demonstrate the SUSI functions. The source code of SusiDemo.exe also has two versions, i.e. Windows CE and Windows XP, and must be compiled under Microsoft Visual C++ 6.0 on Windows XP or under Microsoft Embedded Visual C++ 4.0 on Windows CE. Developers must add the header file Susi.h and library Susi.lib to their own projects when they want to develop something with SUSI.

4.3.4.3 SusiDemo.exe

The SusiDemo.exe test application is an application which uses all functions of the SUSI Library. It has five major function blocks: Watchdog, GPIO, SMBus, I^2C and VGA control. The following screen shot appears when you execute SusiDemo.exe. You can click function tabs to select test functions respectively. Some function tabs will not show on the test application if your platform does not support such functions. For a complete support list, please refer to Appendix A. We describe the steps to test all functions of this application.

4.3.4.4 GPIO

When the application is executed, it will display GPIO information in the *GPIO INFORMATION* group box. It displays *the number of input pins and output pins*. You can click the radio button to choose to test either the single pin function or multiple pin functions. The GPIO pin assignments of the supported platforms are located in Appendix B.

■ **Test Read Single Input Pin**
  – Click the radio button- *Single-Pin*.
  – Key in the pin number to read the value of the input pin. The Pin number starts from '0'.
  – Click the *READ GPIO DATA* button and the status of the GPIO pin will be displayed in *(R/W) Result* field.

■ **Test Read Multiple Input Pin**
  – Click the radio button- *Multiple-Pins*.
  – Key in the pin number from '0x01' to '0x0F' to read the value of the input pin. The pin numbers are ordered bitwise, i.e. bit 0 stands for GPIO 0, bit 1 stands for GPIO 1, etc. For example, if you want to read pin 0, 1, and 3, the pin numbers should be '0x0B'.
  – Click *READ GPIO DATA* button and the statuses of the GPIO pins will be displayed in *(R/W) Result* field.

■ **Test Write Single Output Pin**
  – Click the radio button- *Single-Pin*.
  – Key in the pin numbers you want to write. Pin numbers start from '0'.
  – Key in the value either '0' or '1' in *(R/W) Result* field to write the output pin you chose above step.
  – Click the *WRITE GPIO DATA* button to write the GPIO output pin.

■ **Test Write Multiple Output Pins**
  – Click the radio button- *Multiple-Pins*.
  – Key in the pin number from '0x01' to '0x0F' to choose the multiple pin numbers to write the value of the output pin. The pin numbers are ordered bitwise, i.e. bit 0 stands for GPIO 0, bit 1 stands for GPIO 1, etc. For example, if you want to write pin 0, 1, and 3, the pin numbers should be '0x0B'.
  – Key in the value in *(R/W) Result* field from '0x01' to '0x0F' to write the value of the output pin. The pin numbers are ordered bitwise, i.e. bit 0 stands for GPIO 0, bit 1 stands for GPIO 1, etc. For example, if you want to set pin 0 and 1 high, 3 to low, the pin number should be '0x0B', and then you should key in the value '0x0A' to write.
  – Click the *WRITE GPIO DATA* button to write the GPIO output pins.

4.3.4.5 I^{2}C

When the application is executed, you can read or write a byte of data through I^{2}C devices. All data must be read or written in hexadecimal system.

■ **Read a byte**
  – Key in the slave device address in *Slave address* field.
  – Key in the register offset in *Register Offset* field.
  – Click the *READ A BYTE* button and then a byte of data from the device will be shown on the *Result* field.

■ **Write a byte**
  – Key in the slave device address in *Slave address* field.
  – Key in the register offset in *Register Offset* field.
  – Key in the desirous of data in Result field to write to the device.
  – Click the *WRITE A BYTE* button and then the data will be written to the device through I^{2}C.

4.3.4.6 SMBus

When the application has executed, you can click the radio button to choose to test each access mode, i.e. *Access a byte, Access multiple bytes and Access a word*. All data must be read or written in *hexadecimal* except the numbers for radio button: *Access multiple bytes* mode must be written in *decimal*. You can test the functionalities of the watchdog as follows:

■ **Read a byte**
- Click the radio button- *Access a byte*.
- Key in the slave device address in the *Slave address* field.
- Key in the register offset in the *Register Offset* field.
- Click the *READ SMBus DATA* button and a byte of data from the device will be shown on the *Result* field.

■ **Write a byte**
- Click the radio button- *Access a byte*.
- Key in the slave device address in *Slave address* field.
- Key in the register offset in *Register Offset* field.
- Key the desired data in the *Result* field to write to the device.
- Click the *WRITE SMBus DATA* button and then the data will be written to the device through SMBus.

■ **Read a word**
- Click the radio button- *Access a word*.
- Key in the slave device address in the *Slave address* field.
- Key in the register offset in the *Register Offset* field.
- Click the *READ SMBus DATA* button and then a word of data from the device will be shown on the *Result* field.

■ **Write a word**
- Click the radio button- *Access a word*.
- Key in the slave device address in the *Slave address* field.
- Key in the register offset in the *Register Offset* field.
- Key in the desired data, such as 0x1234, in the Result field to write to the device.
- Click the *WRITE SMBus DATA* button and the data will be written to the device through the SMBus.

■ **Read Multiple bytes**
- Click the radio button- *Access multiple bytes*.
- Key in the slave device address in the *Slave address* field.
- Key in the register offset in the *Register Offset* field.
- Key in the desired number of bytes, such as 3, in the right side field of radio button- *Access multiple bytes*. The number must be written in decimal.
- Click the *READ SMBus DATA* button and then all data from the device will be divided from each other by commas and be shown in the *Result* field.

■ **Write Multiple bytes**
- Click the radio button- *Access multiple bytes*.
- Key in the slave device address in the Slave address field.
- Key in the register offset in the *Register Offset* field.
- Key in the desired number of bytes, such as 3, in the right side field of the radio button- *Access multiple bytes*. The number must be written in decimal.
- Key in all the desired data in the *Result* field in hexadecimal format, divided by commas, for example, 0x50,0x60,0x7A.
- Click the *WRITE SMBus DATA* button and all of the data will be written to the device through the SMBus.

4.3.4.7 VGA Control
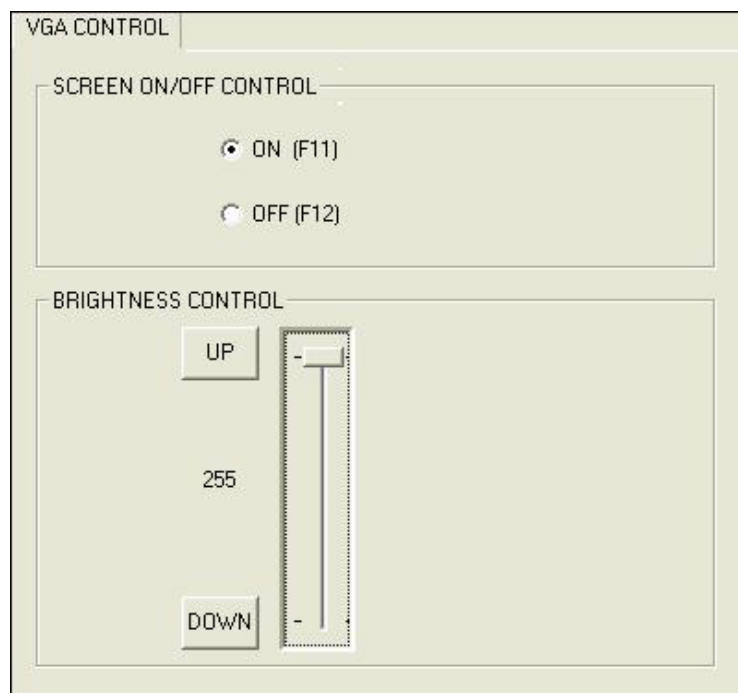
When the application is executed, it will display two blocks of VGA control functions. The application can turn on or turn off the screen shot freely, and it also can tune the brightness of the panels if your platform is being supported. You can test the functionalities of VGA control as follows:

■ **Screen on/off control**
  – Click the radio button *ON* or push the *key F11* to turn on the panel screen.
  – Click the radio button *OFF* or push the *key F12* to turn off the panel screen.
  – The display chip of your platform must be in the support list in Appendix A, or this function cannot work.

■ **Brightness control**
  – Move the slider in increments, using either the mouse or the direction keys, or click the *UP* button to increase the brightness.
  – Move the slider in decrements, using either the mouse or the direction keys, or click the *DOWN* button to decrease the brightness.

4.3.4.8 Watchdog

When the application is executed, it will display watchdog information in the *WATCHDOG INFORMATION* group box. It displays max timeout, min timeout, and timeout steps in milliseconds. For example, a 1~255 seconds watchdog will has 255000 max timeout, 1000 min timeout, and 1000 timeout steps. You can test the functionality of the watchdog as follows:

■ Set the timeout value 3000 (3 sec.) in the *SET TIMEOUT* field and set the delay value 2000 (2 sec.) in the *SET DELAY* field, then click the START button. The *Timeout Countdown* field will countdown the watchdog timer and display 5000 (5 sec.).

■ Before the timer counts down to zero, you can reset the timer by clicking the *REFRESH* button. After you click this button, the Timeout Countdown field will display the value of the *SET TIMEOUT* field.

■ If you want to stop the watchdog timer, you just click the *STOP* button.

4.3.4.9 Hardware Monitor

When the Monitor application is executed by clicking the button, hardware monitoring data values will be displayed. If certain data values are not supported by the platform, the correspondent data field will be grayed-out with a value of 0.

Chapter 5

Extension I/O
Installation

5.1   PC-104 plus

Aim the pin connector to the footprint
and apply force evenly.

after apply force to the IPC connector.
the footprint of the module / CPU board
need to be inserted correctly.

After apply force to the connector
the footprint of the modle / CPU board
need to be inserted correctly.

5.2   PCI

PCI Card

Aim the pin to the footprint
and apply force evenly

Backplane

After apply force to the PCI card,
the footprint of PCI card need to be inserted correctly.

Appendix A

Pin Assignments

A.1 CN2: CD in connector

Table A.1: CN2: CD In connector			
Part Number	1655304020		
Footprint	WF_4P_79_BOX_R1_D		
Description	WAFER BOX 2.0mm 4P 180D(M) W/LOCK A2001WV2-4P		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	CD In Right	IN	
2	AGND	GND	
3	AGND	GND	
4	CD In Left	IN	

A.2 CN4: Audio connector
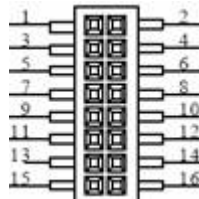
Table A.2: CN4: Audio connector			
Part Number	1653208260		
Footprint	BH8X2SV		
Description	BOX HEADER 8*2P 180D(M) 2.00mm		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	Speaker Out R+	OUT	+V5
2	Speaker Out R-	OUT	+V5
3	Speaker Out L+	OUT	+V5
4	Speaker Out L-	OUT	+V5
5	Line Out Right	OUT	
6	Line Out Left	OUT	
7	AGND	GND	
8	AGND	GND	
9	Line In Right	IN	
10	Line In Left	IN	
11	AGND	GND	
12	AGND	GND	
13	NC		
14	MIC2 In	IN	

Table A.2: CN4: Audio connector		
15	MIC1 In	IN
16	AGND	GND

A.3 CN5: Power connector
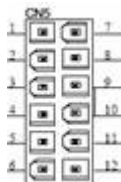
Table A.3: CN5: Power connector			
Part Number	1655412090		
Footprint	ATXCON-2X6V-42		
Description	Power CONN.6*2P 180D(M) DIP W/Fixed Lock		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	GND	GND	
2	+5V	PWR	+5V
3	+5V	PWR	+5V
4	GND	GND	
5	+5V	PWR	+5V
6	+5V	PWR	+5V
7	GND	GND	
8	GND	GND	
9	+5VSB	PWR	+5V
10	PSON#	IN	+5V
11	GND	GND	
12	+12V	PWR	+12V

A.4 CN6: Inverter connector

Table A.4: CN6: Inverter connector			
Part Number	1655305020		
Footprint	WHL5V-2M		
Description	WAFER BOX 2.0mm 5P 180D MALE W/LOCK		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+12V	PWR	+12V
2	GND	GND	
3	LVDS1_BKLTEN	OUT	+3.3V
4	LVDS1_VBR	OD	+3.3V
5	+5V	PWR	+5V

A.5 CN8: VGA connector
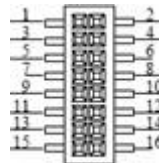
Table A.5: CN8: VGA connector			
Part Number	1653208260		
Footprint	BH8X2SV		
Description	BOX HEADER 8*2P 180D(M) 2.00mm		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	Red	O	
2	+V5_CRT	PWR	+5V
3	GREEN	O	
4	GND	GND	
5	BLUE	O	
6	NC		
7	NC		
8	DDC Data	I/O	
9	GND	GND	
10	HSYNC	O	
11	GND	GND	
12	VSYNC	O	
13	GND	GND	
14	DDC CLK	I/O	
15	GND	GND	
16	NC		

A.6 CN9: LVDS connector
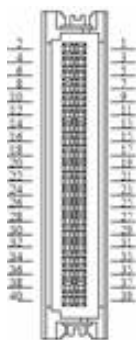
Table A.6: CN9: LVDS connector			
Part Number	1653920200		
Footprint	SPH20X2		
Description	*CONN. DF13-40DP-1.25V		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	VDD_FP	PWR	+5V/+3.3V
2	VDD_FP	PWR	+5V/+3.3V
3	GND		
4	GND		
5	VDD_FP	PWR	+5V/+3.3V
6	VDD_FP	PWR	+5V/+3.3V
7	LVDS_A_D0N	OUT	LVDS
8	LVDS_B_D0N	OUT	LVDS
9	LVDS_A_D0P	OUT	LVDS
10	LVDS_B_D0P	OUT	LVDS
11	GND		
12	GND		
13	LVDS_A_D1N	OUT	LVDS
14	LVDS_B_D1N	OUT	LVDS
15	LVDS_A_D1P	OUT	LVDS
16	LVDS_B_D1P	OUT	LVDS
17	GND		
18	GND		
19	LVDS_A_D2N	OUT	LVDS
20	LVDS_B_D2N	OUT	LVDS
21	LVDS_A_D2P	OUT	LVDS
22	LVDS_B_D2P	OUT	LVDS
23	GND		
24	GND		
25	LVDS_A_CLKN	OUT	LVDS
26	LVDS_B_CLKN	OUT	LVDS
27	LVDS_A_CLKP	OUT	LVDS
28	LVDS_B_CLKP	OUT	LVDS
29	GND		

Table A.6: CN9: LVDS connector			
30	GND		
31	LVDS_DCLK	I/O	+3V~+5V
32	LVDS_DDAT	I/O	+3V~+5V
33	GND		
34	GND		
35	LVDS_A_D3N	OUT	LVDS
36	LVDS_B_D3N	OUT	LVDS
37	LVDS_A_D3P	OUT	LVDS
38	LVDS_B_D3P	OUT	LVDS
39	NC		
40	VCON	OUT	

A.7 CN10: TTL connector (High Bits)
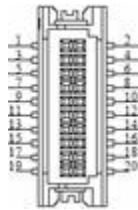
Table A.7: CN10: TTL connector (High Bits)			
Part Number	1653910261		
Footprint	SPH10X2		
Description	CONN. SMD 10*2P 180D(M)DF13-20DP-1.25V(54) HRS		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	GND	GND	
2	GND	GND	
3	High G0	OUT	TTL
4	High G1	OUT	TTL
5	High G2	OUT	TTL
6	High G3	OUT	TTL
7	High G4	OUT	TTL
8	High G5	OUT	TTL
9	High B0	OUT	TTL
10	High B1	OUT	TTL
11	High B2	OUT	TTL
12	High B3	OUT	TTL
13	High B4	OUT	TTL
14	High B5	OUT	TTL
15	GND	GND	
16	GND	GND	
17	NC		
18	NC		
19	NC		
20	NC		

A.8 CN11: TTL connector (Low Bits)
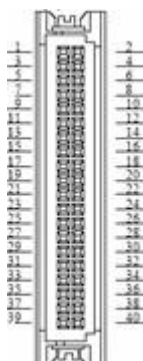
Table A.8: CN11: TTL connector (Low Bits)			
Part Number	1653920200		
Footprint	SPH20X2		
Description	CONN. 40P 90D 1.25mm SMD WO/Pb DF13-40DP-1.25V		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+V5_TFT	PWR	+5V
2	+V5_TFT	PWR	+5V
3	GND	GND	
4	GND	GND	
5	+V3_TFT	PWR	+3.3V
6	+V3_TFT	PWR	+3.3V
7	NC		
8	GND	GND	
9	High R4	OUT	TTL
10	High R5	OUT	TTL
11	Low B0	OUT	TTL
12	Low B1	OUT	TTL
13	Low B2	OUT	TTL
14	Low B3	OUT	TTL
15	Low B4	OUT	TTL
16	Low B5	OUT	TTL
17	High R2	OUT	TTL
18	High R3	OUT	TTL
19	Low G0	OUT	TTL
20	Low G1	OUT	TTL
21	Low G2	OUT	TTL
22	Low G3	OUT	TTL
23	Low G4	OUT	TTL
24	Low G5	OUT	TTL
25	High R0	OUT	TTL
26	High R1	OUT	TTL
27	Low R0	OUT	TTL
28	Low R1	OUT	TTL
29	Low R2	OUT	TTL
30	Low R3	OUT	TTL

Table A.8: CN11: TTL connector (Low Bits)			
31	Low R4	OUT	TTL
32	Low R5	OUT	TTL
33	GND	GND	
34	GND	GND	
35	CLOCK	OUT	TTL
36	VSYNC	OUT	TTL
37	DE		
38	HSYNC	OUT	TTL
39	NC		
40	Backlight Enable	OUT	

A.9 CN12: LAN connector
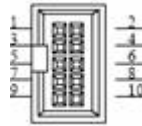
Table A.9: CN12: LAN connector			
Part Number	1653205201		
Footprint	BH5X2DV-2M		
Description	BOX HEADER 5*2P 180D(M) 2.0mm DIP W/O Pb		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	TGND	GND	
2	TGND	GND	
3	LANM3+	I/O	LAN
4	LANM3-	I/O	LAN
5	LANM2+	I/O	LAN
6	LANM2-	I/O	LAN
7	LANM1+	I/O	LAN
8	LANM1-	I/O	LAN
9	LANM0+	I/O	LAN
10	LANM0-	I/O	LAN

A.10 CN13: HDD LED and POWER LED
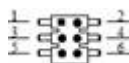
Table A.10: CN13: HDD LED and POWER LED			
Part Number	1653003260		
Footprint	JH3X2S-2M		
Description	PIN HEADER 3*2P 180D(M) 2.0mm SMD SQUARE PIN		
Pin	Pin Name	Signal Type	Signal Level
1	NC		
2	PWR LED-	GND	GND
3	NC		
4	PWR LED+	OUT	+5V
5	HDD LED -	GND	GND
6	HDD LED +	OUT	+5V

A.11 CN15: LPT / FDD connector
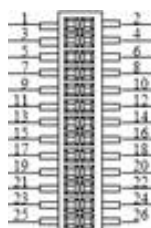
Table A.11: CN15: LPT / FDD connector			
Part Number	1653213260		
Footprint	BH13X2SV		
Description	BOX HEADER 13*2P 180D(M) 2.0mm SMD		
Pin	Pin Name (LPT)	Pin Name (FDD)	Signal Level
1	STB#	DS0#	
2	AFD#	DRVDEN0	
3	D0	INDEX#	
4	ERR#	HDSEL#	
5	D1	TRK0#	
6	INIT#	DIR#	
7	D2	WP#	
8	SLIN#	STEP#	
9	D3	RDATA#	
10	GND	GND	
11	D4	DSKCHG#	
12	GND	GND	
13	D5	-	
14	GND	GND	

Table A.11: CN15: LPT / FDD connector		
15	D6	IMTR0#
16	GND	GND
17	D7	-
18	GND	GND
19	ACK#	DS1#
20	GND	GND
21	BUSY	MTR1#
22	GND	GND
23	PE	WDATA#
24	GND	GND
25	SLCT	WGATE#
26	NC	

A.12 CN16: IDE connector
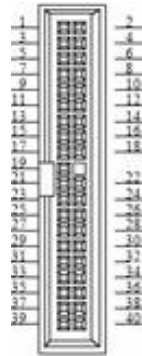
Table A.12: CN16: IDE connector			
Part Number	1653220205		
Footprint	BH20X2DV-1		
Description	BOX HEADER 20*2P 180D(M) 2.54mm DIP NO.20P		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	RESET#	Out	+5V
2	GND	GND	
3	DD7	I/O	+5V
4	DD8	I/O	+3.3V
5	DD6	I/O	+5V
6	DD9	I/O	+5V
7	DD5	I/O	+5V
8	DD10	I/O	+5V
9	DD4	I/O	+5V
10	DD11	I/O	+5V
11	DD3	I/O	+5V
12	DD12	I/O	+5V
13	DD2	I/O	+5V
14	DD13	I/O	+5V
15	DD1	I/O	+5V

Table A.12: CN16: IDE connector			
16	DD14	I/O	+5V
17	DD0	I/O	+5V
18	DD15	I/O	+5V
19	GND	GND	
21	DMARQ	Out	+5V
22	GND	GND	
23	DIOW#	Out	+5V
24	GND	GND	
25	DIOR#	Out	+5V
26	GND	GND	
27	IORDY	Out	+5V
28	CSEL	Out	+5V
29	DMACK#	Out	+5V
30	GND	GND	
31	INTRQ	In	+5V
32	NC		
33	DA1	In	+5V
34	PDIAG#	In	+5V
35	DA0	In	+5V
36	DA2	In	+5V
37	CS#1	Out	+5V
38	CS#3	Out	+5V
39	DASP#	Out	+5V
40	GND	GND	

A.13 CN17: PC104-plus connector

Table A.13: CN17: PC-104/+ Connector	
Part Number	1653130428, 165313222A, 165312022A
Footprint	PCI-PLUS
Description	PCB SKT 30*4 180D(F)PC/104+ SOLDER WO/Pb EPT

A.14 CN19: COM1~4 connector
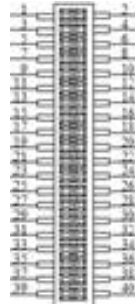
Table A.14: CN19: COM1~4 Connector			
Part Number	1653220260		
Footprint	BH20X2SV		
Description	BOX HEADER 20*2P 180D(M) 2.0mm SMD		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	COM0_DCD#	IN	+5V
2	COM0_DSR#	IN	+5V
3	COM0_RXD	IN	+5V
4	COM0_RTS#	I/O	+5V
5	COM0_TXD	OUT	+5V
6	COM0_CTS#	IN	+5V
7	COM0_DTR#	I/O	+5V
8	COM0_RI#	IN	+5V
9	GND		
10	GND		
11	COM1_DCD#	IN	+5V
12	COM1_DSR#	IN	+5V
13	COM1_RXD	IN	+5V
14	COM1_RTS#	I/O	+5V
15	COM1_TXD	OUT	+5V
16	COM1_CTS#	IN	+5V
17	COM1_DTR#	I/O	+5V
18	COM1_RI#	IN	+5V
19	GND		
20	GND		
21	COM2_DCD#	IN	+5V
22	COM2_DSR#	IN	+5V
23	COM2_RXD	IN	+5V
24	COM2_RTS#	I/O	+5V
25	COM2_TXD	OUT	+5V
26	COM2_CTS#	IN	+5V
27	COM2_DTR#	I/O	+5V
28	COM2_RI#	IN	+5V
29	GND		
30	GND		
31	COM3_DCD#	IN	+5V

Table A.14: CN19: COM1~4 Connector			
32	COM3_DSR#	IN	+5V
33	COM3_RXD	IN	+5V
34	COM3_RTS#	I/O	+5V
35	COM3_TXD	OUT	+5V
36	COM3_CTS#	IN	+5V
37	COM3_DTR#	I/O	+5V
38	COM3_RI#	IN	+5V
39	GND		
40	GND		

A.15 CN20: USB1/2 Connector
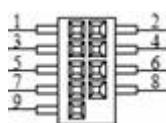
Table A.15: CN20: USB1/2 Connector			
Part Number	1653205261		
Footprint	HD_5x2P_79_BOX_N10		
Description	PIN HEADER 5x2P 180D(M) 2.0mm SMD IDIOT-PROOF		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+V5DUAL_USB0	PWR	+5V
2	+V5DUAL_USB0	PWR	+5V
3	USB0_z_P-	I/O	
4	USB1_z_P-	I/O	
5	USB0_z_P+	I/O	
6	USB1_z_P+	I/O	
7	GND		
8	GND		
9	GND		

A.16 CN22: Reset Button connector

Table A.16: CN22: Reset Bottom Connector			
Part Number	1655302020		
Footprint	WHL2V-2M		
Description	WAFER BOX 2P 180D 2.0mm MALE W/Lock		
Pin	Pin Name	Signal Type	Signal Level
1	FRP_RST#	IN	+3.3V
2	GND	GND	

A.17 CN23: Power Button connector

Table A.17: CN23: Power Button Connector			
Part Number	1655302020		
Footprint	WHL2V-2M		
Description	WAFER BOX 2P 180D 2.0mm MALE W/Lock		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	PM_PWRBTN#	IN	+3.3V
2	GND	GND	

A.18 CN24: SIR connector

Table A.18: CN24: SIR Connector			
Part Number	1655305020		
Footprint	WHL5V-2M		
Description	WAFER BOX 2.0mm 5P 180D(M) W/LOCK		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+V5_IrDA	PWR	+5V
2	NC		
3	RXD	IN	+5V
4	GND	GND	
5	TXD	OUT	+5V

A.19 CN25: PS2 Keyboard/Mouse connector

Table A.19: CN25: PS2 Keyboard/Mouse connector			
Part Number	1655306020		
Footprint	WHL6V-2M		
Description	WAFER BOX 2.0mm 6P 180D(M) W/LOCK		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	KBCLK	IN	+5V
2	KBDAT	IN	+5V
3	MSCLK	IN	+5V
4	GND		
5	+KBVCC	PWR	+5V
6	MSDAT	IN	+5V

A.20 CN26: CF TYPEII connector

Table A.20: CN26: CF TYPEII connector			
Part Number	1653050111		
Footprint	COMPACK-60111220		
Description	CF Header TypeII 50P 90D(M) Standoff 60311220		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	GND	GND	
2	IDE_PDD3	I/O	+5V
3	IDE_PDD4	I/O	+5V
4	IDE_PDD5	I/O	+5V
5	IDE_PDD6	I/O	+5V
6	IDE_PDD7	I/O	+5V
7	IDE_PDCS#1	OUT	+5V
8	GND	GND	
9	GND	GND	
10	GND	GND	
11	GND	GND	
12	GND	GND	
13	+5V	PWR	+5V
14	GND	GND	
15	GND	GND	
16	GND	GND	
17	GND	GND	
18	IDE_PDA2	IN	+5V
19	IDE_PDA1	IN	+5V

Table A.20: CN26: CF TYPEII connector			
20	IDE_PDA0	IN	+5V
21	IDE_PDD0	I/O	+5V
22	IDE_PDD1	I/O	+5V
23	IDE_PDD2	I/O	+5V
24	NC		
25	GND	GND	
26	NC		
27	IDE_PDD11	I/O	+5V
28	IDE_PDD12	I/O	+5V
29	IDE_PDD13	I/O	+5V
30	IDE_PDD14	I/O	+5V
31	IDE_PDD15	I/O	+5V
32	IDE_PDCS#3	OUT	+5V
33	NC		
34	IDE_PDIOR#	OUT	+5V
35	IDE_PDIOW#	OUT	+5V
36	IDE_WE#	OUT	+5V
37	IDE_IRQ	IN	+5V
38	+5V	PWR	+5V
39	CF_CSEL#	OUT	+5V
40	NC		
41	RESET#	OUT	+5V
42	IDE_PDIORDY	OUT	+5V
43	IDE_PDDREQ	OUT	+5V
44	IDE_PDDACK#	OUT	+5V
45	IDEACTS#	I/O	+5V
46	IDE_P66DET#	IN	+5V
47	IDE_PDD8	I/O	+5V
48	IDE_PDD9	I/O	+5V
49	IDE_PDD10	I/O	+5V
50	GND		

A.21 CN27: -V5 and -V12 connector

Table A.21: CN27: -V5 and -V12 connector			
Part Number	1655303020		
Footprint	WHL3V-2M		
Description	WAFER BOX 2.0mm 3P 180D w/LOCK		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	-V5	PWR	-5V
2	GND		
3	-V12	PWR	-12V

A.22 CN28: USB3/4 Connector
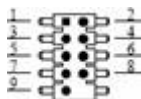
Table A.22: CN28: USB3/4 Connector			
Part Number	1653205261		
Footprint	HD_5x2P_79_BOX_N10		
Description	PIN HEADER 5x2P 180D(M) 2.0mm SMD IDIOT-PROOF		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+V5DUAL_USB1	PWR	+5V
2	+V5DUAL_USB1	PWR	+5V
3	USB2_z_P-	I/O	
4	USB3_z_P-	I/O	
5	USB2_z_P+	I/O	
6	USB3_z_P+	I/O	
7	GND		
8	GND		
9	GND		

A.23 CN29: DDR2 SODIMM Socket

Table A.23: CN29: DDR2 SODIMM Socket	
Part Number	1651000087
Footprint	DDR-SODIMM-STD65
Description	SKT DIMM 200P DDR2 H=6.5mm STD SMD WO/Pb

A.24 CN30: DVI connector
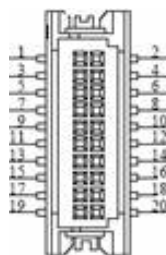
Table A.24: CN30: DVI Connector			
Part Number	1653910261		
Footprint	SPH10X2		
Description	*CONN. SMD 10*2P 180D(M)DF13-20DP-1.25V HRS		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	DVI_D0-	OUT	TMDS
2	+5V	PWR	+5V
3	DVI_D0+	OUT	TMDS
4	DVI_CLK-	OUT	TMDS
5	GND	GND	
6	DVI_CLK+	OUT	TMDS
7	DVI_D1-	OUT	TMDS
8	GND	GND	
9	DVI_D1+	OUT	TMDS
10	I2C_CLK	I/O	
11	GND	GND	
12	I2C_DATA	I/O	
13	DVI_D2-	OUT	TMDS
14	HP_DET	IN	+5V
15	DVI_D2+	OUT	TMDS
16	NC		
17	+5V	PWR	+5V
18	NC		
19	GND		
20	GND		

A.25 CN31: SATA 1 connector
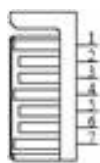
Table A.25: CN31: SATA 1 connector			
Part Number	1654003639		
Footprint	SATA_7P_0-1770655-1_D		
Description			
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	GND	GND	
2	SATA0 TX+	I/O	
3	SATA0 TX-	I/O	
4	GND	GND	
5	SATA0 RX-	I/O	
6	SATA0 RX+	I/O	
7	GND	GND	

A.26 CN32: SATA 2 connector
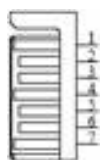
Table A.26: CN32: SATA 2 connector			
Part Number	1654003639		
Footprint	SATA_7P_0-1770655-1_D		
Description			
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	GND	GND	
2	SATA1 TX+	I/O	
3	SATA1 TX-	I/O	
4	GND	GND	
5	SATA1 RX-	I/O	
6	SATA1 RX+	I/O	
7	GND	GND	

A.27 CN33: Battery Connector

Table A.27: CN33: Battery Connector			
Part Number	1655902032		
Footprint	WHL2V-125		
Description	WAFER 2P 180D(M) 1.25mm DIP 53047-0210		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+VBAT	PWR	
2	GND		

A.28 CN34: LAN LED connector
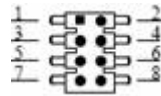
Table A.28: CN34: LAN LED Connector			
Part Number	1653004260		
Footprint	JH4X2S-2M		
Description	PIN HEADER 4*2P 180D(M) 2.0mm SMD		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+V3.3_LAN	PWR	+3.3V
2	GND		
3	LAN1_LINKLED	OUT	+3.3V
4	NC		
5	LAN1_ACTLED	OUT	+3.3V
6	NC		
7	LAN1_LINK1000#	OUT	+3.3V
8	NC		

A.29 CN36: GPIO1 Connector
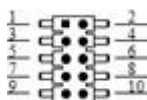
Table A.29: CN36: GPIO1 Connector

Part Number	1653005261		
Footprint	HD_5x2P_79_BOX		
Description	PIN HEADER SMD 5*2P 180D(M) 2.0mm		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+5V	PWR	+5V
2	GPIO4	I/O	+5V
3	GPIO0	I/O	+5V
4	GPIO5	I/O	+5V
5	GPIO1	I/O	+5V
6	GPIO6	I/O	+5V
7	GPIO2	I/O	+5V
8	GPIO7	I/O	+5V
9	GPIO3	I/O	+5V
10	GND		

A.30 CN37: GPIO2 Connector
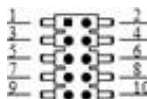
Table A.30: CN37: GPIO2 Connector

Part Number	1653005261		
Footprint	HD_5x2P_79_BOX		
Description	PIN HEADER SMD 5*2P 180D(M) 2.0mm		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+5V	PWR	+5V
2	GPIO12	I/O	+5V
3	GPIO8	I/O	+5V
4	GPIO13	I/O	+5V
5	GPIO9	I/O	+5V
6	GPIO14	I/O	+5V
7	GPIO10	I/O	+5V
8	GPIO15	I/O	+5V
9	GPIO11	I/O	+5V
10	GND		

A.31 CN38: USB5/6 Connector
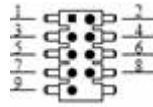
Table A.31: CN38: USB5/6 Connector			
Part Number	1653205261		
Footprint	HD_5x2P_79_BOX_N10		
Description	PIN HEADER 5x2P 180D(M) 2.0mm SMD IDIOT-PROOF		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+V5DUAL_USB2	PWR	+5V
2	+V5DUAL_USB2	PWR	+5V
3	USB4_z_P-	I/O	
4	USB5_z_P-	I/O	
5	USB4_z_P+	I/O	
6	USB5_z_P+	I/O	
7	GND		
8	GND		
9	GND		

A.32 CN41: COM 5/6 (RS-422 / 485) connector
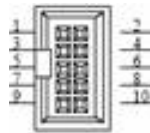
Table A.32: CN41: COM 5/6 / 422 / 485 connector			
Part Number	1653205201		
Footprint	BH5X2DV-2M		
Description	BOX HEADER 5*2P 180D(M) 2.0mm DIP W/O Pb		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	COM4_TXD (5_422_RXD-)	OUT	+5V
2	COM5_TXD (6_422_RXD-)	OUT	+5V
3	COM4_RTS# (5_422_RXD+)	I/O	+5V
4	COM5_RTS# (6_422_RXD+)	I/O	+5V
5	COM4_RXD (5_485-422_TXD+)	IN	+5V
6	COM5_RXD (6_485-422_TXD+)	IN	+5V
7	COM4_CTS# (5_485-422_TXD-)	IN	+5V
8	COM5_CTS# (6_485-422_TXD-)	IN	+5V
9	GND		
10	GND		

Appendix B

Optional Extras for the PCM-9588

The PCM-9588 requires several cables for normal operation. You can make them yourself or purchase an optional cable kit assembly, which includes the following

B.1 PCM-10586-9588E Cable kit for PCM-9588

PCM-10586-9588E

Installation wiring kit for PCM-9588T-M0A1E/ PCM-9588F-S0A1E

The cable kit PCM-10586-9588E includes the following cables:

Part No.	Cable Description	Quantity	PCM-9588 Connector	Terminating Connector
1700160160	Audio cable	1	CN4	Cable 16Pin(2.0mm) Audio 16cm
1701160101	CRT cable	1	CN8	Cable ASS'Y VGA 10cm D-SUB 15P to 16P 2.0mm
1700002142	LAN cable	1	CN12	LAN Cable IDC10P 2.0mm/ RJ45 15CM
1700260250	LPT port cable	1	CN15	Cable 25cm 25P to 26P ASS'Y LPT Port 2.0mm
1701400452	IDE cable	1	CN16	FLAT CABLE 40P GRAY FOR DMA-66 PIN20 I.P. 45CM
1701400181	COM1/2/3/4 cable	1	CN19	FLAT CABLE 18CM IDC40P 2.0mm/4COM
1703100260	USB Port cable	3	CN20, CN28, CN38	Wire 10P 26cm 2.0mm For USB 2 PORT
1703060191	PS2 Keyboard/ Mouse connector	1	CN25	Cable 6P-2.0mm Housing/ 6P (PS/2)/6P (K/B) 19cm
1700002474	SATA Cable	2	CN31, CN32	CABLE 7P/7P SATA L=18cm
1700011211	COM5/6 cable	1	CN41	A Cable 2*5P-2.0/D-SUB(M) 9P+D-SUB(M) 9P 21cm

Table B.1: PCM-10586-9588E Cable kit for PCM-9588

Appendix **C**

Programmable GPIO &
Watchdog Timer

C.1 Watchdog Timer

```
;The SCH3114/SCH3106 Runtime base I/O address is 800h
Setting WatchDog time value location at offset 66h
;If set value "0", it is mean disable WatchDog function.
Superio_GPIO_Port = 800h
mov   dx,Superio_GPIO_Port + 66h
mov   al,00h
out   dx,al


.model small
        .486p
        .stack 256
        .data
        SCH3114_IO   EQU   800h
        .code
        org     100h
 .STARTup
;==================================================================
;47H
;enable WDT function bit [3:2]=11
;==================================================================


        mov   dx,SCH3114_IO + 47h
        mov   al,0ch
        out   dx,al



;==================================================================
;65H
;bit [1:0]=Reserved
;bit [6:2]Reserve=00000
;bit [7] WDT time-out Value Units Select
;Minutes=0 (default) Seconds=1
;==================================================================


        mov   dx,SCH3114_IO + 65h ;
        mov   al,080h
        out   dx,al



;==================================================================
;66H
;WDT timer time-out value
;bit[7:0]=0~255
;==================================================================


        mov   dx,SCH3114_IO + 66h
        mov   al,01h
```

C.2 GPIO Sample Code

```
;================================================================
  NEWIODELAY Macro
        out  0ebh,al
        ENDM
;================================================================
        .model small
        .486p
        .stack 256
        .data
;================================================================
;            Data Area
;================================================================
    SMBus_Port      EQU      500h
    PCA9554_ID      EQU      40h
    PCA9554_ID2     EQU      4Eh
    Input_Reg       EQU      00h
    Output_Reg      EQU      01h
    Inversion_Reg   EQU      02h
    Configure_Reg   EQU      03h
;RA02   Advantech_Str      db 'Advantech Company Copyright (C) 2005 Design by
Duncan',0AH,0Dh,'$'
    Advantech_Str   db 'Advantech Company Copyright (C) 2005 Design by Duncan,
Modify by Steven',0AH,0Dh,'$'   ;RA02
    GX3_Fun_Str     db  'Check Philip GPIO function.',0Ah,0Dh,'$'
    Note1_Str       db  'Test Method: GPIO 0 connect to GPIO 1.',0Ah,0Dh,'$'
    Note2_Str       db  'GPIO 2 connect to GPIO 3.',0Ah,0Dh,'$'
    Note3_Str       db  'GPIO 4 connect to GPIO 5.',0Ah,0Dh,'$'
    Note4_Str       db  'GPIO 6 connect to GPIO 7.',0Ah,0Dh,'$'
    Success1_Str    db  'First GPIO Chip Test success !! ',0Ah,0Dh,'$'
    Success2_Str    db  'Second GPIO Chip Test success !! ',0Ah,0Dh,'$'
;RA02 - START
Success_lenght  EQU     ($ - offset Success1_Str) / 2
                db  'Third GPIO Chip Test success !! ',0Ah,0Dh,'$'
                db  'Fouth GPIO Chip Test success !! ',0Ah,0Dh,'$'
                db  'Fifth GPIO Chip Test success !! ',0Ah,0Dh,'$'
                db  'Sixth GPIO Chip Test success !! ',0Ah,0Dh,'$'
                db  'Seventh GPIO Chip Test success !!',0Ah,0Dh,'$'
                db  'Eighth GPIO Chip Test success !! ',0Ah,0Dh,'$'
;RA02 - END
    Fail_Str        db  'First GPIO Chip Test Fail !! ',0Ah,0Dh,'$'
    Fail2_Str       db  'Second GPIO Chip Test Fail !! ',0Ah,0Dh,'$'
;RA02 - START
Fail_lenght    EQU     ($ - offset Fail_Str) / 2
                db  'Third GPIO Chip Test Fail !! ',0Ah,0Dh,'$'
```

```
                db  'Fouth GPIO Chip Test Fail !!  ',0Ah,0Dh,'$'
                db  'Fifth GPIO Chip Test Fail !!  ',0Ah,0Dh,'$'
                db  'Sixth GPIO Chip Test Fail !!  ',0Ah,0Dh,'$'
                db  'Seventh GPIO Chip Test Fail !!',0Ah,0Dh,'$'
                db  'Eighth GPIO Chip Test Fail !! ',0Ah,0Dh,'$'
        Error_Str1    db  'Error !! The system has no GPIO Chip or no support INT15
hook! ',0Ah,0Dh,'$'
;RA02 - END




;================================================================
;           Main Program Start
;================================================================

.code
            org    100h
 .STARTup
            ;Clear Screen
            pusha
            lea    dx, Advantech_Str
            mov    ah,09h
            int    21h
            lea    dx, GX3_Fun_Str
            mov    ah,09h
            int    21h
            lea    dx, Note1_Str
            mov    ah,09h
            int    21h
            lea    dx, Note2_Str
            mov    ah,09h
            int    21h
            lea    dx, Note3_Str
            mov    ah,09h
            int    21h
            lea    dx, Note4_Str
            mov    ah,09h
            int    21h
;RA02 - START
;================================================================
;     Get Number of GPIO group
;     one group mean 8 gpio pins(one GPIO Chip)
; Input:
;     ax=5E87h
;     bh=00h
; output:
```

```
;       ax=5E78        ;function success, other value means function fail
;       cl= n group of gpio
;======================================================================


;======================================================================
;       Get GPIO Config
; Input:
;       ax=5E87h
;       bh=01h
;       cl= n ; n means which group of GPIO you want to get
; output:
;       ax=5E78        ;function success, other value means function fail
;       bl= the n group of gpio config
;          bit 0 = gpio 0 , 0 => output pin; 1 => input pin
;          bit 1 = gpio 1 , 0 => output pin; 1 => input pin
;             .....
;          bit 7 = gpio 7 , 0 => output pin; 1 => input pin
;======================================================================


;======================================================================
;       Set GPIO Config
; Input:
;       ax=5E87h
;       bh=02h
;       cl= n ; n means which group of GPIO you want to set
;       bl= the n group of gpio config
;          bit 0 = gpio 0 , 0 => output pin; 1 => input pin
;          bit 1 = gpio 1 , 0 => output pin; 1 => input pin
;             .....
;          bit 7 = gpio 7 , 0 => output pin; 1 => input pin
; output:
;       ax=5E78        ;function success, other value means function fail
;======================================================================


;======================================================================
;       Get GPIO status
; Input:
;       ax=5E87h
;       bh=03h
;       cl= n ; n means which group of GPIO you want to get
; output:
;       ax=5E78        ;function success, other value means function fail
;       bl= the n group of gpio status
;          bit 0 = gpio 0 , 0 => Low; 1 => High
;          bit 1 = gpio 1 , 0 => Low; 1 => High
```

```
;              .....
;         bit 7 = gpio 7 , 0 => Low; 1 => High
;===============================================================


;===============================================================
;      Set GPIO status
; Input:
;      ax=5E87h
;      bh=04h
;      cl= n ; n means which group of GPIO you want to set
;      bl= the n group of gpio status
;         bit 0 = gpio 0 , 0 => Low; 1 => High
;         bit 1 = gpio 1 , 0 => Low; 1 => High
;              .....
;         bit 7 = gpio 7 , 0 => Low; 1 => High
; output:
;      ax=5E78        ;function success, other value means function fail
;===============================================================
;RA02 - END
;RA02 - START
          mov     ax,5e87h
          mov     bh,00h
          int     15h
          cmp     ax,5e78h
          je      next_test

          lea     dx, Error_Str1
          mov     ah,09h
          int     21h
          jmp     Finish_Test
next_test:
          xor     ch,ch
          push    cx            ;save NO. of GPIO chip
;RA02 - END
        ;1.Set GPIO 0,2,4,6 as output, GPI 1,3,5,7 as input
;RA02 - START
          mov     ax,5e87h
          mov     bx,02aah
          int     15h
;RA02 - END
        ;2. Set GPIO 0,2,4,6 Output Low
;RA02 - START
          pop     cx            ;restore  NO. of GPIO chip
          push    cx            ;save NO. of GPIO chip
          mov     ax,5e87h
```

```
        mov    bx,0400h
        int    15h
;RA02 - END
        ;3. Check GPI 1,3,5,7 value
;RA02 - START
        pop    cx          ;restore  NO. of GPIO chip
        push   cx          ;save NO. of GPIO chip
        mov    ax,5e87h
        mov    bx,03FFh
        int    15h

        pop    cx          ;restore  NO. of GPIO chip
        push   cx          ;save NO. of GPIO chip
        dec    cx

        mov    al,Fail_lenght
        mul    cl
        lea    dx, Fail_Str
        add    dx,ax
        cmp    bl,00
        jne    test_result


        ;4. Set GPIO 0,2,4,6 Output differential
        pop    cx          ;restore  NO. of GPIO chip
        push   cx          ;save NO. of GPIO chip
        mov    ax,5e87h
        mov    bx,0411h
        int    15h
        ;5. Check GPI 1,3,5,7 value
        pop    cx          ;restore  NO. of GPIO chip
        push   cx          ;save NO. of GPIO chip
        mov    ax,5e87h
        mov    bx,03FFh
        int    15h

        pop    cx          ;restore  NO. of GPIO chip
        push   cx          ;save NO. of GPIO chip
        dec    cx

        mov    al,Fail_lenght
        mul    cl
        lea    dx, Fail_Str
        add    dx,ax
        cmp    bl,33h
```

```
                    jne    test_result


        ;RA02 - END

        ;RA02            cmp    al,00h
        ;RA02            jne    test_fail
            ;4.Set GPIO 1,3,5,7 as output,GPIO 0,2,4,6 as input
        ;RA02 - START
                pop    cx
                push   cx
                mov    ax,5e87h
                mov    bx,0255h
                int    15h
        ;RA02 - END
            ;4. Set GPIO 1,3,5,7 Output High
        ;RA02 - START
                pop    cx            ;restore  NO. of GPIO chip
                push   cx             ;save NO. of GPIO chip
                mov    ax,5e87h
                mov    bx,04ffh
                int    15h
        ;RA02 - END
            ;6. Check GPIO 0,2,4,6 value
        ;RA02 - START
                pop    cx            ;restore  NO. of GPIO chip
                push   cx             ;save NO. of GPIO chip
                mov    ax,5e87h
                mov    bx,0300h
                int    15h

                pop    cx            ;restore  NO. of GPIO chip
                push   cx             ;save NO. of GPIO chip
                dec    cx

                mov    al,Fail_lenght
                mul    cl
                lea    dx, Fail_Str
                add    dx,ax
                cmp    bl,0ffh
                jne    test_result


            ;4. Set GPIO 1,3,5,7 Output differential
                pop    cx            ;restore  NO. of GPIO chip
```

```
                push    cx          ;save NO. of GPIO chip
                mov     ax,5e87h
                mov     bx,0422h
                int     15h
            ;5. Check GPI 0,2,4,6 value
                pop     cx          ;restore  NO. of GPIO chip
                push    cx          ;save NO. of GPIO chip
                mov     ax,5e87h
                mov     bx,03FFh
                int     15h

                pop     cx          ;restore  NO. of GPIO chip
                push    cx          ;save NO. of GPIO chip
                dec     cx

                mov     al,Fail_lenght
                mul     cl
                lea     dx, Fail_Str
                add     dx,ax
                cmp     bl,33h
                jne     test_result

                pop     cx          ;restore  NO. of GPIO chip
                push    cx          ;save NO. of GPIO chip
                dec     cx
                mov     al,Success_lenght
                mul     cl
                lea     dx, Success1_Str
                add     dx,ax

            ;Do Second PCA9554 test
            ;1.Set GPIO 0,2,4,6 as output, GPI 1,3,5,7 as input

test_result:
                mov     ah,09h
                int     21h
                pop     cx
                dec     cx
                jnz     next_test
    Finish_Test:
                popa
                .exit
;================================================================
;Input     : CL - register index
;          CH - device ID
```

```
;Output : AL - Value read
;==============================================================
Ct_I2CReadByteProcNear

        push  cx

        mov   dx,SMBus_Port +04h
        inc   ch
        mov   al,ch              ;ID cmd(read)
        out   dx,al
        NEWIODELAY
        NEWIODELAY

        call  CT_Chk_SMBus_Ready

        pop   ax
        mov   dl,03h
        out   dx,al              ;Index
        NEWIODELAY
        NEWIODELAY

        mov   dl,02h
        mov   al,48h
        out   dx,al              ;Read data
        NEWIODELAY
        NEWIODELAY

        mov   cx, 100h

@@:
        newiodelay
        loop  short @B

        call  CT_Chk_SMBus_Ready

        mov   dl,05
        in    al,dx              ;Data0
        NEWIODELAY
        NEWIODELAY

        ret
Ct_I2CReadByteEndp
;==============================================================
;Input : CL - register index
;         CH - device ID
```

```
;           AL - Value to write
;Output: none
;================================================================
Ct_I2CWriteByteProcNear

        push  ax
        push  cx

        mov   dx,SMBus_Port +04h
        mov   al,ch                ;ID cmd(Write)
        out   dx,al
        call  Delay5ms
        call  Delay5ms

        call  CT_Chk_SMBus_Ready

        pop   ax
        mov   dl,03h
        out   dx,al                ;Index
        call  Delay5ms
        call  Delay5ms

        pop   ax
        mov   dl,05
        out   dx,al                ;Data0
        call  Delay5ms
        call  Delay5ms

        mov   dl,02h
        mov   al,48h
        out   dx,al                ;write data
        call  Delay5ms
        call  Delay5ms

        mov   cx, 100h
    @@:
        newiodelay
        loop  short @B

        call  CT_Chk_SMBus_Ready

        ret
Ct_I2CWriteByteEndp
CT_Chk_SMBus_ReadyProcNear
        mov   dx,SMBus_Port + 0;status port
```

```asm
                clc
                mov   cx,0800h
Chk_I2c_OK:
                in     al,dx          ;get status
                NEWIODELAY
                out    dx,al          ;clear status
                NEWIODELAY

                test   al, 02H        ;termination of command ?
                jnz    short Clear_final

                and    al, NOT 40H;mask INUSE bit
                or     al,al          ;status OK ?
                jz     short Clear_final

                test   al,04h         ;device error
                jnz    short SMBus_Err

                loop   short Chk_I2c_OK
            ;SMbus error due to timeout
SMBus_Err:

                stc
                ret
Clear_final:
                clc
                ret
CT_Chk_SMBus_ReadyEndp



;;================================================================
Delay5msprocnear
                push  cx
                mov   cx, 1000
        @@:
                NEWIODELAY
                loop   short @B
                pop    cx
                ret
Delay5ms        ENDP
Phoenix_debuger  proc near
            pushf
            push cx
            push offset PhdebugRetAddr
            push cs
```

```
        push cs
        db 0EAh
        dw 0013h
        dw 0DA00h
PhdebugRetAddr:
        popf
Phoenix_debuger  endp
```

;==
;   Program END
;==

```
    END
```

Appendix D

Electrical Specifications

D.1 Input Power

This chapter describes how to choose a suitable power supply for this board. The guideline is as follows.

D.1.1 Power Supply selection

The power supply which we select should have over-current protection and the over-current protection value of the power supply must meet 1.5~2 times of the total power consumption.

## D.1.2 Power requirement of power supply

When trying to find a suitable power supply, consider not only this board power consumption but you also need to consider the total system power requirements. The power requirement is based on system configuration. For example, Total power requirement = CPU board + peripheral (USB) + system device (IDE, SATA HD) + add on card.

D.1.3 Rising time

(1) ATX: Power Rising Time (T=0.1mS ~ 20mS)
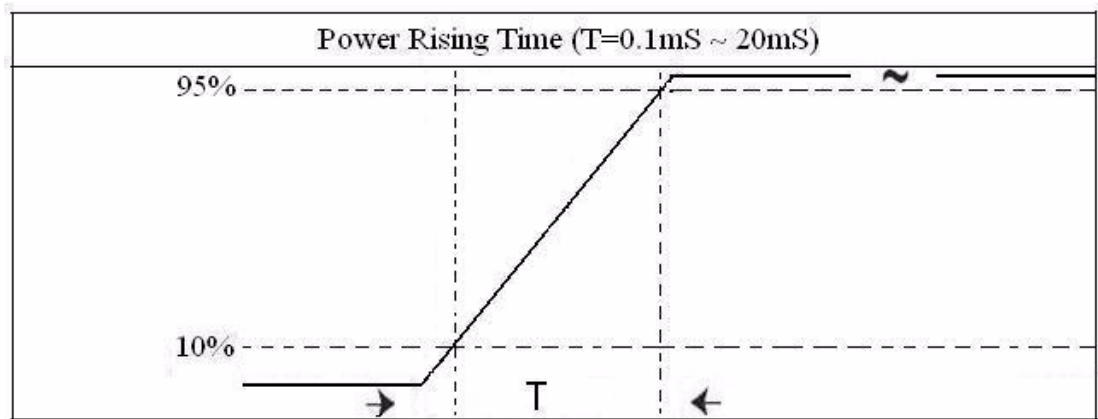
(2) AT: Power Rising Time (T=5mS ~ 15mS)
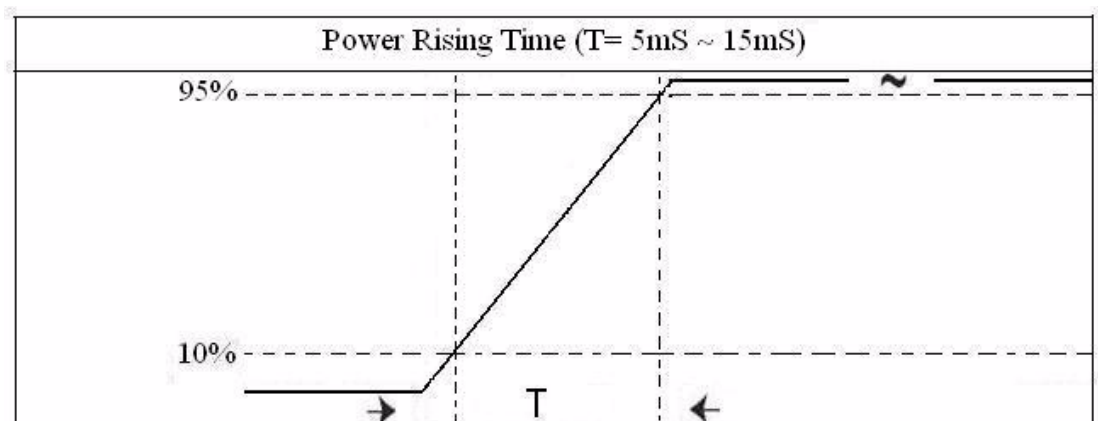
D.2 I/O Port

I/O	Reference	Signal Name	Rated Output (±5%)
Inverter	CN6	+12V	12V/1.5A
		+5V	5V/1.5A
LVDS	CN9	VDD_FP	5V/1A or 3.3V/1A
TTL	CN11	+V5_TFT	5V/1A
		+V3_TFT	3.3V/1A
USB	CN20	+V5DUAL_USB0	5V (0.5A/per channel, 1A optional) *Note 1
	CN28	+V5DUAL_USB1	
	CN38	+V5DUAL_USB2	
SIR	CN24	+V5_IrDA	5V/0.5A
DVI	CN30	+5V	5V/0.5A
GPIO	CN36	+5V	VCC:+5V/1A
		GPIOn (n=0~15)	GPIOn: - 20mA (Sink) + 50mA (Source)
	CN37	+5V	VCC:+5V/1A
		GPIOn (n=0~15)	GPIOn: - 20mA (Sink) + 50mA (Source)
Speaker	CN4	Speaker Out	8Ω load 1.1W 4Ω load 2.2W
CRT	CN8	+V5_CRT	5V/1A (Reserved)
PS2	CN25	+KBVCC	5V/1A

Table D.1: I/O Port

Note!

1. *If customers use a USB hub which provides upstream power to the system, please contact Advantech AE to purchase a specific cable that protects the system.*
2. *Output voltage has ±5% tolerance.*
3. *5V rated output is provided via protection circuit or from PSU directly so the voltage level will depend on input voltage level.*

Appendix E

System Assignments

E.1 System I/O Ports

Addr. Range (Hex)	Device
00h–08h	DMA Controller
09h–0Eh	RESERVED
0Fh	DMA Controller
10h–18h	DMA Controller
19h–1Eh	RESERVED
1Fh	DMA Controller
20h–2Dh	Interrupt Controller
2E–2F	LPC SIO
30h–3Dh	Interrupt Controller
40h–42h	Timer/Counter
43h	RESERVED
4E–4F	LPC SIO
50h–52h	Timer/Counter
53h	RESERVED
60h	Micro controller
61h	NMI Controller
62h	Micro controller
63h	NMI Controller
64h	Micro controller
65h	NMI Controller
66h	Micro controller
67h	NMI Controller
70h	RESERVED
71h-77h	RTC Controller
80h	DMA Controller
81h–91h	DMA Controller
92h	Reset Generator
93h–9Fh	DMA Controller
A0h–B1h	Interrupt Controller
B2h–B3h	Power Management
B4h–BDh	Interrupt Controller
C0h–D1h	DMA Controller
D2h–DDh	RESERVED
DEh–DFh	DMA Controller
170h–177h	IDE Controller
1F0h–1F7h	IDE Controller
376h	IDE Controller
3F6h	IDE Controller
4D0h–4D1h	Interrupt Controller
CF9h	Reset Generator

Table E.1: System I/O Ports

E.2 1st MB Memory Map

Table E.2: Table C.2: 1st MB memory map	
Addr. Range (Hex)	**Device**
F0000h – FFFFFh	Upper BIOS Area (64kB)
E0000h – EFFFFh	Lower BIOS Area (64kB) 16kB x 41
C0000h – DFFFFh	Expansion Card BIOS and Buffer Area (128kB) 16kB x8
A0000h – BFFFFh	Standard PCI/ISA Video Memory (SMM Memory) 128kB
00000h – 9FFFFh	DOS Area
* Refer to Intel 852GM/852GMV Chipset GMCG Datasheet	

E.3 DMA Channel Assignments

Table E.3: DMA channel assignments	
Channel	**Function**
0	Available
1	Reserved (audio)
2	Floppy disk (8-bit transfer)
3	Available (parallel port)
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available
* Audio DMA select 1, 3, or 5	
** Parallel port DMA select 1 (LPT2) or 3 (LPT1)	

E.4 Interrupt assignments

Table E.4: Interrupt assignments	
Interrupt#	**Interrupt source**
IRQ0	Interval timer
IRQ1	Keyboard
IRQ2	Interrupt from controller 2 (cascade)
IRQ3	COM1
IRQ4	COM2
IRQ5	COM3
IRQ6	Reserved
IRQ7	AUDIO/LPT
IRQ8	RTC
IRQ9	COM5
IRQ10	COM4
IRQ11	COM6
IRQ12	Reserved
IRQ13	Math Coprocessor
IRQ14	Fixed Disk
IRQ15	Reserved

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